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Predictors of Women's Choices in Breastfeeding Initiation and Exclusivity at Six Months

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PREDICTORS OF WOMEN'S CHOICES IN BREASTFEEDING INITIATION, AND EXCLUSIVITY AT SIX MONTHS

by

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ABSTRACT

The purpose of this study was to analyze the Canadian Maternal Experiences Survey to determine the predictors of breastfeeding initiation and exclusive breastfeeding at six months. Logistic regression analyses were used to assess potential predictors. Independent predictors for breastfeeding initiation included: adequate information about feeding, assistance with breastfeeding initiation, postpartum maternal skin contact, baby's location in the first hour after birth, province of birth, maternal immigration, maternal smoking, maternal dissatisfaction with support from her husband/partner during labour, length of time the baby spent in a different room in the first twenty four hours, mother's level of education, and population size. Independent predictors for exclusive breastfeeding at six months were: adequate information received about formula feeding, pacifier use, contact made by a healthcare provider after the birth, marital status, province of birth, mother's return to work, maternal smoking, timing until first breastfeeding, maternal breast pain, maternal age, and prepregnancy BMI.

DEDICATION

I would like to dedicate this work to all the mothers I have come in contact with over the past seven years as a neonatal intensive care unit nurse. It is from these interactions that my thirst to learn more about women's breastfeeding choices has come.

I would also like to dedicate this to the women who participated in the Maternity Experiences Survey. Without their participation, this research could not have been done.

ACKNOWLEDGEMENTS

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Chapter I

Introduction

Problem Statement

The premise that a woman's body is insufficient to breastfeed her baby exclusively is pandemic. Different cultures all over the world initiate prelacteal feedings with water, sweetened water, teas, mustard oil and more (Mihrshahi et al., 2007). Women who give birth in hospitals are often offered a stash of formula for that "just in case" moment, initiating an uncertainty of the mother's own body. The struggle to illustrate that breast is best is not new. Over one hundred years ago the medical community was fighting against the introduction of commercial formulas in Great Britain and New Zealand, while America was embracing this new found freedom for mothers (Bryder, 2009).

While the debate continues on, the maternal and infant benefits of breastfeeding have been persistently demonstrated in the literature (World Health Organization (WHO), 2002). Research in developing countries has been conducted to determine how many lives could be saved with breast milk. According to Jones et al. (2003), if 90% of mothers in the developing world breastfed exclusively until six months, 1.3 million children's lives would be saved. This accounts for 13% of all child deaths under the age of five. There is no other preventative intervention that can boast such a high rate of success for saving the lives of children under the age of five.

As the evidence mounts, the recommendation for duration of breastfeeding extends. The recommended length of time for mothers to exclusively breastfeed their babies is now six months. In Canada 90.3% of women initiate breastfeeding; however,

exclusive breastfeeding rates at six months after birth are only 14.4%. (Chalmers et al., 2009). The term "exclusive breastfeeding" is defined by the World Health Organization as:

> No other food or drink, not even water, except breast milk (including milk expressed or from a wet nurse) for 6 months of life, but allows the infant to receive ORS [oral rehydration solution], drops and syrups (vitamins, minerals and medicines). (WHO, para. 6, 2010).

The World Health Organization is a leading centre for breastfeeding research. In 2001, an expert panel released recommendations for mothers to exclusively breastfeed for six months as opposed to the previously recommended 4 months (WHO, 2002). The expert panel based their recommendations on a systematic review of the literature in which they compared infant outcomes of exclusive breastfeeding for 4 months compared to 6 months. The literature review revealed that exclusively breastfeeding for 6 months was beneficial for both mothers and babies.

In 2004, three years after the WHO released their report, Health Canada increased their recommendation for exclusive breastfeeding to six months (Health Canada, 2004). Their current recommendation is:

Exclusive breastfeeding is recommended for the first six months of life for healthy term infants, as breast milk is the best food for optimal growth. Infants should be introduced to nutrient-rich, solid foods with particular attention to iron at six months with continued breastfeeding for up to two years and beyond (p 1).

Health Canada made this recommendation following a review of the evidence presented by WHO in 2001 and a review of the literature from a Canadian frame of

reference (Health Canada, 2004). One year following Health Canada's new recommendation, the Canadian Paediatric Society (CPS) adopted the WHO recommendation (CPS, 2009). The Registered Nurses Association of Ontario (RNAO) has also adopted the recommendation by developing a best practice guideline that endorses the WHO optimal duration of 6 months of exclusive breastfeeding (RNAO, 2003). In addition to these policy statements, Jack Newman, a well-known Canadian breastfeeding advocate, supports the WHO, Health Canada, the CPS and RNAO by recommending women continue breastfeeding their babies into toddlerhood (Newman, 2009). For years Newman has offered mothers hands-on breastfeeding education and problem solving in various breastfeeding clinics, with the goal of fiercely protecting and supporting a mother's breastfeeding experience.

Evidence supporting the recommendation of exclusive breastfeeding for six months continues to grow. Despite the research and recommendations by numerous health care associations, Canadian mothers are falling short of the recommended six months of exclusive breastfeeding. Sadly, only 14.4% of Canadian mothers are breastfeeding exclusively for six months (Chalmers et al., 2009). Numerous studies have identified predictors of breastfeeding initiation and duration, but little is known about exclusivity at six months postpartum. To date the Canadian Community Health Survey has been the primary tool utilized by Canadian researchers to analyze breastfeeding predictors of early cessation; however, the analysis has only examined demographic and socio-economic factors (Miller & Maclean, 2005). A more comprehensive analysis of the perinatal predictors of Canadian women's breastfeeding choices is required.

Significance to Nursing

Nurses are often the most prevalent health care professional during a woman's maternity experience. During the prenatal experience, mothers are seen by nurses in obstetrical offices, prenatal clinics and prenatal classes. These are prime opportunities for assessing mothers' desires for breastfeeding and their risk for early cessation of breastfeeding. These frequent visits also provide an excellent time period for educating mothers on the benefits of breastfeeding. Research indicating the predictors of early cessation of breastfeeding would provide nurses during the prenatal period the necessary information to screen women at risk for early cessation and implement interventions to alleviate the risk.

During the labour, delivery and immediate post-partum period, it is usually a nurse who is in direct and continuous contact with the mother and baby dyad. Mothers often look to the nurse for advice and assistance for feeding choices and difficulties they may be experiencing. Identified predictors of early cessation of breastfeeding that are specific to this period would help nurses to develop or improve best practices, and to minimize practices that may impede breastfeeding.

After mothers have been discharged home, nurses in community health settings like public health units and maternal newborn clinics, are the point of care access for any mother who may need assistance caring for their infant. Nurses in this setting often see mothers in their own home and are able to assess feeding practices and offer assistance to mothers. Difficulties in breastfeeding often surface following discharge from the hospital. By understanding predictors of early cessation in the post-partum period,

community health nurses would be able to provide mothers with interventions specific to their needs and attempt to decrease the risk of early cessation.

Nurses in Canada have a social commitment to deliver health promotion and illness prevention from both an individual and population perspective. At every turn of the maternity experience there is an opportunity for a mother to interact with a nurse. During these encounters, nurses can meet their social commitments of health promotion and illness prevention by providing women with the education necessary to successfully breastfeed exclusively until six months. By understanding the predictors of early cessation, nurses can focus individually on increasing breastfeeding rates, which in turn, will improve the health of Canadian infants.

Purpose of the Study

The purpose of the study is to analyze the Maternal Experiences Survey (MES) to determine the predictors of breastfeeding initiation and exclusive breastfeeding at six months. The MES is the first Canadian survey that encompasses women's experiences of pregnancy, labour, delivery and the postpartum time period (Public Health Agency of Canada (PHAC), 2009). Through the Public Health Agency of Canada, the Maternity Experiences Study Group developed this survey. It is a cross sectional design constructed from the 2006 Canadian Census of Population. The objective of this survey was to collect data that could enhance the health outcomes of both mothers and babies in Canada. The study group focused on collecting perinatal health indicators like delivery of health care during the pregnancy, labour and delivery practices, health of the newborn, breastfeeding practices, mother's perceptions of their postpartum health care and other

factors that have impacted a mother's maternity experiences, i.e. demographics, support systems, and stressors.

Utilization of the data from the MES helps to meet the call for research from Health Canada. Following the recommendation for six months of exclusive breastfeeding, Health Canada recommended that further research be done to identify population-based cost-effective approaches to support the implementation of the new recommendation (Health Canada, 2004). Developing interventions to support this recommendation is a key step in increasing the breastfeeding rates in Canada; however, if the predictors of early cessation are not well understood, then developing interventions may be based on faulty reasoning. Prior to the step of developing interventions, we need to identify the obstacles to exclusive breastfeeding until six months, and then appropriate interventions can be developed.

The World Health Organization has also made recommendations for research in this area. One of the recommendations includes identifying biological and social constraints to exclusive breastfeeding to six months in different geographical and cultural settings (WHO, 2002). Canada is a vast country composed of provinces and territories. The MES is a national survey which includes data about geographical location. Through an analysis of this survey, differences in geographic location, and potential cultural differences have been identified. The WHO has also recommended that research should assess the role of care during pregnancy in relation to the adequacy of lactation in the first six months. The MES has an extensive prenatal section which covers the maternal experience on a wide range of topics.

Theoretical Framework

Social Cognitive Theory (SCT) was developed by Albert Bandura and was originally named Social Learning Theory (Bandura, 1977). This theory focuses on the life-long development of humans and can be used with adults or children (Bandura, 1989). The central model in SCT is called Triadic Reciprocal Causation (TRC) (Bandura, 2003). This term has also undergone name changes over the years; however, the basic tenets have not changed. The model is made up of three concepts which Bandura (1989) uses to theorize how human behaviour is developed. SCT postulates that behaviour, person and environment "operate as interacting determinants that influence each other bidirectionally" (Bandura, 1989, p 2).

The first segment in the TRC model is the link between person and behaviour which can be described as the interaction between a person's thoughts, feelings, biological make-up, and intentions with their actions (p 2). The person's actions or behaviours can then in turn influence the person's reaction (p 3). The second segment is the interaction between environment and person which can be described as the interaction between external influences that convey modeling, instruction and persuasion which affect a person's cognition and emotional experiences (p 3). The last segment is the interaction between environment and behaviour which is described as "environmental influences [that] in turn partly determine which forms of behaviour are developed and activated" (p 4).

The TRC model provides a depiction of how the development of breastfeeding behaviours can be impacted by the mother's environment and her cognitive, affective and biological make-up. For the purpose of this study the model will be used to provide

structure to the many predictors identified in the literature. Bandura's concepts of person and environment represent the predictors of breastfeeding outcomes, while the concept of behaviour represents the outcome behaviours of breastfeeding initiation and exclusivity. This model can also be used to identify gaps in the available literature of potential predictors that require further investigation.

The predictors identified in the literature review have been categorized into Bandura's concepts from the TRC model.

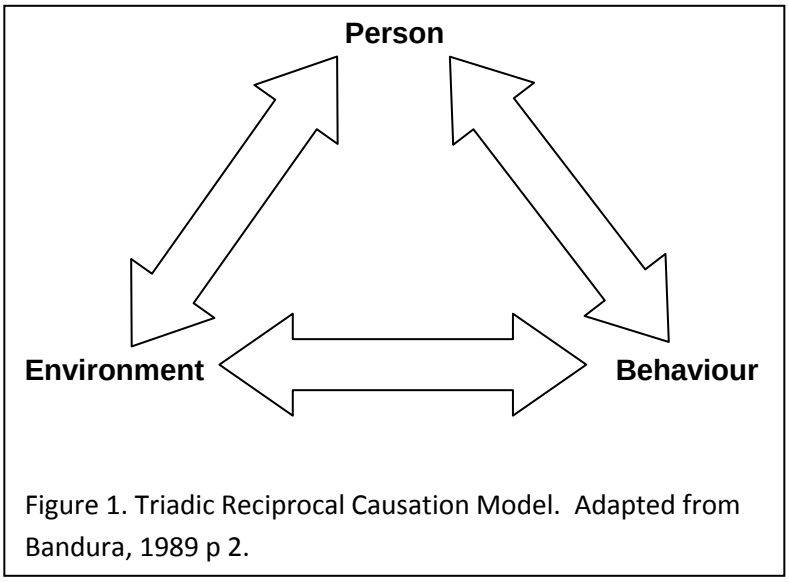

Figure 1. Triadic Reciprocal Causation Model. Adapted from Bandura, 1989 p 2.

Behaviour

- Initiation of breastfeeding
- Exclusive breastfeeding at six months

Person

- Maternal health
- Infant health
- Body mass index

- Number of live births
- Maternal smoking and alcohol consumption
- Maternal depression and stress
- Maternal perception of their labour and delivery experience
- Maternal perception of labour support
- Socio-demographic variables
- Birth weight

Environment

- Prenatal classes
- Adequate feeding information
- Professional support within the community
- Labour support
- Mode of delivery
- Use of labour analgesia
- Baby friendly hospital initiatives
- Length of stay
- Mother’s return to employment
- Social support
- Prenatal care provider

Chapter II

Review of the Literature

Search Strategy

The literature in this review was obtained from the following databases: Cumulative Index to Nursing and Allied Health Literature; Cochrane database of systematic reviews; OVID; Proquest Nursing and Allied Health Source Journals; and PubMed. The key search words used included: breastfed, breastfeeding, breast milk, predictors, factors, determinants, exclusive, exclusivity, and six months. These terms were utilized in various combinations during the search process. Twenty-five articles, including three systematic reviews with meta-analyses, two literature reviews and twenty studies were obtained. Each article was reviewed for predictors of early cessation of exclusive breastfeeding prior to six months. Predictors of initiation and duration were also found and identified. There were four Canadian studies found that addressed the predictors of breastfeeding, one from a national sample, two from an Ontario sample and one from a sample of women in Calgary, Alberta.

The benefits of breast milk have been well documented in the literature. The added benefits of exclusive breastfeeding for six months are gaining the same importance in research and society. As the evidence mounts, the recommendation for duration of exclusive breastfeeding extends. The recommended length of time for mothers to exclusively breastfeed their infant is now six months (Health Canada, 2004). Health Canada has recommended that further research be done to identify population-based, cost-effective approaches to support the implementation of their recommendation (Health Canada, 2004). Developing interventions to support this recommendation is a key step in

increasing the breastfeeding rates in Canada; however, if the predictors of early cessation are not well understood, then developing interventions may be based on faulty reasoning of the facts. This review of the literature has addressed the identified predictors of breastfeeding initiation, duration and exclusivity. The review has been categorized into prenatal, intrapartum, postpartum and socio-demographic factors to match the proposed research questions.

Prenatal Predictors of Breastfeeding Outcomes

A review of the literature revealed a number of predictors of breastfeeding initiation, duration and exclusivity that are associated with the prenatal period. For the purpose of this literature review, the prenatal period includes the time period prior to a woman becoming pregnant and the duration of her pregnancy before the baby is born. These prenatal predictors identified include maternal attitude toward breastfeeding, body mass index, smoking, attendance at childbirth classes, depression, anxiety and adequate feeding information. Each of these predictors has been included in the prenatal category because the research cited is specific to the prenatal period.

Body mass index.

Donath and Amir (2000) conducted a secondary analysis of the Australian National Health Survey from 1995 (n = 1991) and found that mothers who had a self-reported BMI greater than 30 were less likely to initiate breastfeeding. Similarly Mok et al. (2008) conducted a prospective case-control study to determine the effects of prepregnant obesity on breastfeeding practices and perceptions in a population of women in France. The 222 participants were followed for three months. There was a statistically significant difference found for initiation of breastfeeding between the two groups (case:

obese, control: normal). The prepregnant obese mothers were more likely to not initiate breastfeeding when compared to the normal weight mothers ($p < .01$). Differences were also found between the case and control group in terms of why they chose not to breastfeed. The obese group most often stated decency as their reason for not initiating breastfeeding, while the normal weight group stated they lacked a desire to breastfeed. In comparison, Hilson, Rasmussen, and Kjolhede, (1997) reviewed medical records of 1109 mother-infant dyads at a hospital in Cooperstown, NY and its associated outreach clinics. The authors found that there was no statistical difference between the women categorized as obese, versus those who were not, in their choice to initiate breastfeeding. Conversely, when looking at duration of breastfeeding, the same authors did find statistical differences between the groups. Those women who were obese in the prepregnant period were more likely to stop breastfeeding by hospital discharge, than those who were a normal weight (adjusted OR = 3.65, $p = .0007$).

Early cessation of breastfeeding has also been noted in other studies (Donath & Amir, 2000; Mok et al., 2008), including a Canadian study which noted that obesity prior to pregnancy was considered an independent risk factor for early cessation of breastfeeding (adjusted OR 2.13, 95% CI = 1.29 – 3.53) (Kehler, Chaput & Tough, 2009). Only one study revealed a link between maternal obesity and exclusivity of breastfeeding (Mok et al, 2008). Women who were obese were less likely to be breastfeeding exclusively at one and three months; however there was no statistical difference for partial breastfeeding. Obese mothers were also more likely to report difficulties with the breastfeeding while in the hospital and at one and three months, compared to the reference group. The literature contains conflicting support for obesity

as a predictor of initiation, while duration and exclusivity at three months have been clearly supported. Further research should be conducted to identify if obesity is a predictor of exclusivity at six months.

Smoking.

Smoking during pregnancy has been found to be a predictor of decreased initiation rates of breastfeeding in a number of studies. In a literature review of studies focusing on developed countries, smoking during pregnancy was found to be inversely related to both breastfeeding initiation and duration (Dennis, 2000). Similarly Grossman, Fitzsimmons, Larsen-Alexander, Sachs and Harter (1990) and Hilson, Rasmussen and Kjolhede (1997) found that women who did not smoke were more likely to make a decision to breastfeed.

The effect of maternal smoking on duration has been identified by an Australian study (Donath & Amir, 2000), a Canadian study (Kehler et al., 2009) and a Norwegian study (Lande et al., 2003). Each study identified smoking during pregnancy as a significant risk factor for early cessation of breastfeeding. More specifically, in a systematic review of seventy eight studies published between 1976 and 2008, Wijndaele, Lakshman, Landsbaugh, Ong and Ogilvie (2009), found that smoking was a factor that was instrumental in women introducing foods prior to six months. While the previous study does not address exclusivity because it omits the introduction of liquids, a retrospective study by Lande et al., (2003) did look at exclusivity. The analysis from the self-administered questionnaire, which included 3000 infants who were 6 months of age, found that mothers who smoked were less likely to be exclusively breastfeeding at 4 months and breastfeeding at six months ($p < 0.001$). The literature consistently identifies

smoking as a predictor of initiation, duration and exclusivity at four months. Additional research about exclusivity at six months is required.

Attendance at child birth classes.

Child birth classes often include information that pertains to breastfeeding. One type of child birth classes has been cited as impacting breastfeeding outcomes. Researchers have reported an association between attendance at a Lamaze class and the decision to breastfeed (Grossman, Fitzsimmons, Larsen-Alexander, Sachs, & Harter, 1990). Women in the study (n = 220) participated in a face-to-face interview while patients on a postpartum floor in a hospital, and in an eight week follow-up phone call. The authors found that women who attended Lamaze classes were more likely to make a decision to breastfeed. A stepwise logistic regression found that "women who had not received Lamaze instruction, had no previous success with breastfeeding, and less than a high school education had a 99 percent chance of choosing bottle feeding." (p 35). This study cannot be generalized to all childbirth classes as only one type of class was included. Further research could be conducted to clarify if attendance at any childbirth class affected initiation, duration or exclusivity.

Maternal attitude toward breastfeeding.

A woman`s attitude about breastfeeding during the prenatal period has also been found to impact breastfeeding initiation (Dennis, 2002; Millar & Maclean, 2005). A literature review by Dennis (2002), found two studies which reported that women who had a positive attitude about breastfeeding during their pregnancy were more likely to initiate breastfeeding. In addition, an analysis of the 2003 Canadian Community Health Survey (n = 7 266) showed that 23% of the women who chose not to breastfeed cited it

was unappealing or disgusting (Millar & Maclean, 2005). While this study revealed the frequency of women who thought breastfeeding was unappealing, it did not reveal if this was a statistically significant predictor of initiation. Evidence looking at maternal breastfeeding attitudes and their effect on duration and exclusivity was not found.

Depression.

Research literature has identified both a history of depression and postpartum depression as having an impact on the duration of breastfeeding. Women who have a history of depression, experience depression during pregnancy (Kehler et al., 2009) or in the postpartum period (Pugh & Milligan, 1998) report earlier cessation of breastfeeding. In a case-control study of parental mental health, the authors found that a diagnosis of a mental health disorder was not statistically significant for duration of breastfeeding (Falceto, Giugliania, & Fernandes, 2004). However, it was found that those mothers who suffered from emotional and relational problems in the first month after delivery were twice as likely to wean in that first month. This association remains close to significant ($p = 0.052$) when controlling for maternal age, birth order, mother-child separation and rooming-in. Further research with a larger sample size could reveal if prenatal or postpartum depression have an effect on breastfeeding exclusivity.

Sparse research on the effect of maternal anxiety on breastfeeding outcomes has been found. This could be in part due to the blurring of terminology between depression, anxiety, and maternal confidence. One study was found that investigated anxiety. Kehler et al. (2009), found in their Canadian study that anxiety during pregnancy was an independent risk factor for early cessation of breastfeeding prior to six months (OR = 1.80).

Adequate breastfeeding information

Breastfeeding information has the potential to increase awareness and knowledge of techniques required to breastfeed a child. One study has identified maternal perception of adequacy of prenatal breastfeeding information as a predictor of breastfeeding outcomes. An Australian, prospective, longitudinal study was conducted to determine which modifiable antenatal factors impact a woman's choice of infant feeding and her duration of breastfeeding (Blythe et al., 2004). Mothers who scored high on their breastfeeding information scale were more likely to be breastfeeding at one week, compared with those who did not (94.7% vs. 86.0%, $p < .05$).

Limited research has also reported that women who receive advice or support about formula feeding before their baby is born are more likely to discontinue breastfeeding by four weeks postpartum (OR = 1.72) (Sheehan et al., 2001). Studies that measure the effects of prenatal breastfeeding and formula feeding education are limited, specifically with regard to how it might affect breastfeeding exclusivity.

Intrapartum Predictors of Breastfeeding Outcomes

The intrapartum period is the time during the labour and birth of the baby. The review of the literature revealed four predictors that were categorized into the intrapartum period: mode of delivery, use of labour analgesia, labour support and birth weight. Birth weight was included in the intrapartum period as this was the best fit with the Maternity Experiences Survey.

Mode of delivery.

Mode of delivery refers to the way in which a woman delivers her baby. The delivery can be either vaginal or by caesarean section. Conflicting research regarding the

effect of caesarean sections on breastfeeding outcomes exists. In a review by Dennis (2002), two studies showed no association between the mode of delivery and breastfeeding, while 4 studies showed that c-sections reduced the incidence of initiation but did not affect duration of breastfeeding. Grossman et al. (1990) found that women who had vaginally delivered were twice as likely to be breastfeeding at eight weeks postpartum than those who had delivered by caesarean section ($p < 0.002$). This study did not include data past eight weeks postpartum. Conflicting and limited evidence is apparent with respect to the predictor of mode of delivery and its impact on breastfeeding exclusivity.

Use of labour analgesia.

The use of labour analgesia is also debated in the literature. In the literature review by Dennis (2002), one study indicated that labour analgesia had a negative impact on the development of positive breastfeeding behaviours. Two other studies in the same review showed that there was diminished suckling initially; however, it did not affect breastfeeding duration.

Labour support.

Labour support can be described as having someone who is responsible for providing support to the mother throughout her labour. This can take on a variety of forms such as the labouring woman's friend, partner or a hired doula. A doula is an individual trained in providing physical and emotional comfort to the mother throughout the intrapartum period. The effect of having a doula for continuous labour support on breastfeeding outcomes has been reviewed. In the literature review by Dennis (2002), one study found that there was no effect on breastfeeding outcomes, while one meta-

analysis and two additional studies found that doula support was positively correlated with exclusive breastfeeding at four and six weeks postpartum. .

Postpartum Predictors of Breastfeeding Outcomes

A review of the literature found that there were eight predictors in the postpartum period. The postpartum period is the time after the baby is born. The eight predictors include: the Baby Friendly Hospital Initiative, maternal confidence, infant health, maternal health and professional support in the community, number of live births, partner support for breastfeeding and social support for breastfeeding.

Baby friendly hospital initiatives.

The Baby Friendly Hospital Initiative (BFHI) is a program developed by the World Health Organization and by UNICEF to promote breastfeeding in hospitals. There are ten steps that must be followed if a hospital is deemed to be baby friendly. The ten steps include:

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one half-hour of birth.
5. Show mothers how to breastfeed and maintain lactation, even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.

7. Practice rooming in - that is, allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

(Unicef, 2010).

These ten steps were the focus of one randomized control trial which found that the BFHI has a profound effect on breastfeeding rates (Kramer et al., 2001). The study was conducted in thirty-one maternity hospitals and clinics in the Republic of Belarus. The sample was comprised of 17,046 mother-infant dyads who were randomly assigned to either the experimental group or control group. The intervention in the experimental group was modeled after the BFHI. The control intervention used traditional policies and procedures for infant feeding. Duration and exclusivity of breastfeeding at 3 and 6 months were among the outcome measures.

> The proportion of women exclusively breastfeeding at 3 months was seven-fold higher in the experimental group (43.3%vs 6.4%) and more than 12 fold higher at 6 months (7.9% vs.0.6%). Nearly twice as many women in the intervention group were predominantly breastfeeding at 3 months (51.9% vs. 28.3%) and nearly 7 times as many at 6 months (10.6% vs. 1.6%). (Results section, para 3).

Consistent with Kramer et al. (2001), a literature review by Dennis (2002), and three independent studies (Falceto et al., 2004; Murray et al., 2007; Sheehan et al., 2006),

identified individual predictors that are included in the ten steps to successful breastfeeding. The literature review by Dennis (2002), identified timing of initiation of breastfeeding, rooming-in and supplementary feedings as predictors of breastfeeding outcomes. The review found two studies that showed early initiation of breastfeeding increased duration; however, a small meta-analysis (n=209) and a systematic review of ten studies showed no critical period for breastfeeding initiation. The review also found that supplementation in the hospital decreased the duration of breastfeeding. This has been supported by an Ontario study in which supplementation, as well as mothers who had a desire to learn more about formula feeding, decreased the duration of breastfeeding (Sheehan et al., 2006).

The research reviewed by Dennis (2002) also supports the practice of rooming-in, with the positive results of increasing the duration of breastfeeding. Rooming-in is the practice of having the baby stay in the same room as the mother and being cared for by the mother. This practice is common in Canadian hospitals. In further support of rooming-in, a Brazilian study (Falceto et al., 2004) which sought to determine if parental mental health affected breastfeeding outcomes, found that mothers who were not separated from their child while in the hospital were more likely to be breastfeeding at 4 months ($p = 0.29$).

A survey conducted in Colorado (USA), explored baby friendly hospital practices, many of which were the same as the ten steps in the BFHI (Murray et al., 2007). According to the study, there were five practices that had a statistically significant effect on duration of breastfeeding; these were independent of socio-demographic factors. The five hospital practices were: breastfeeding within the first hour after birth, feeding the

infant only breast milk while in the hospital, mother and infant rooming-in together, abstaining from pacifier use while in the hospital and the hospital giving a telephone number to call for breastfeeding information after discharge. Mothers at 16 weeks after discharge who encountered all five of the practices were more likely to be breastfeeding than those who did not (68% vs. 53%). Women who experienced the five practices were less likely to cite insufficiency of breast milk and difficulty nursing as reasons for discontinuing breastfeeding.

Maternal confidence.

Maternal confidence in the ability to breastfeed has also been found to have an impact on breastfeeding outcomes. In the literature review by Dennis (2002), three studies were cited that showed a mother`s self-confidence in her breastfeeding abilities impacted the duration of breastfeeding. As a mother`s self confidence decreased, the duration of breastfeeding also decreased. Similar findings were illustrated in a more recent study by Blythe et al. (2004). In this Australian study, a breastfeeding self-efficacy tool was utilized to determine how a mother`s confidence in her breastfeeding ability impacted breastfeeding outcomes. The authors found that mothers who scored high on the breastfeeding self-efficacy tool were more likely to be breastfeeding at one week than those with lower scores ($p < .001$). This was exemplified further between those mothers who were breastfeeding exclusively compared with those who were partially breastfeeding or exclusively bottle feeding at four months ($p < .001$). The statistical analyses found that mothers with higher self-confidence scores were 1.59 times more likely to continue breastfeeding at four months. This literature supports maternal confidence as a predictor of breastfeeding duration and exclusivity.

Infant health.

At times, babies are born with health concerns that can affect their care. Concerns with infant health impacting initiation and duration have been cited by one literature review and two Canadian studies (Dennis et al., 2002; Millar & Maclean, 2005; Sheehan et al., 2006). The studies report that infant health problems resulted in increased weaning, thereby decreasing exclusivity of breastfeeding. Furthermore in the Canadian analysis of the 2003 Canadian Community Health Survey (Millar & Maclean, 2005), some of the women also cited the baby's medical condition as a reason for not initiating breastfeeding.

Maternal health.

Maternal health complications can also affect the care of a new baby and impact infant feeding decisions. In a Canadian analysis of the 2003 Canadian Community Health Survey, 20% of the women who chose not to breastfeed cited a maternal medical condition (Millar & Maclean, 2005). Women also cited medical problems as a reason for weaning before six months. Therefore, maternal health complications have both an impact on initiation and duration of breastfeeding; however, the effect of maternal health complications on breastfeeding exclusivity has not been measured.

Professional support within the community.

Professional support in the community refers to health care professionals who can support a woman's decision to breastfeed. Two systematic reviews have been identified that address professional support within the community as a predictor of breastfeeding outcomes (Dyson et al., 2005; Britton et al., 2007). In the systematic review, and meta-analysis by Dyson et al., (2005), eleven (n=1553) randomized-controlled trials with

breastfeeding promotion interventions were included in the analyses. The meta-analysis showed that maternal educational interventions had a statistically significant increase on the initiation of breastfeeding. In the Cochrane database systematic review and meta-analysis by Britton et al. (2007) professional support had an effect on both duration and exclusivity of breastfeeding. Professional support had a positive effect on breastfeeding by decreasing cessation at four months and increasing exclusivity (RR 0.91, 95% CI 0.84 – 0.98). The review also identified that face-to-face support showed benefits for increasing duration, whereas phone support, or phone and face-to-face support, showed no significant difference. Similarly, Sheehan et al. (2006) reported that a single follow-up phone call and one in-home visit did not impact breastfeeding duration at 4 weeks postpartum. The authors hypothesize that decisions about breastfeeding duration are determined prior to contact with a public health nurse, and that multiple visits may be necessary to impact breastfeeding duration.

An earlier study done by Sheehan et al. (2001) also identified that visits to a family physician and limited access to breastfeeding support impacted breastfeeding duration. Analysis of the first Ontario Mother and Infant Survey revealed that women who saw a doctor for themselves were more likely to discontinue breastfeeding prior to 4 weeks postpartum (OR = 1.62). The authors suggested that physicians do not have the skills to help with breastfeeding needs and this is potentially the reason why women do not continue when faced with difficulties. Another key predictor was women who identified that they needed breastfeeding support and were unable to access it. This limited access to breastfeeding help significantly increased early cessation at 4 weeks postpartum (OR = 4.91). Comparably, a qualitative study which sought to describe the

experiences of 17 culturally diverse women found that lack of support from health care professionals was a hindrance to the breastfeeding process (Locklin, 1995). While this study did not quantify breastfeeding outcomes, it does give insight into women`s experiences with health care professionals.

Partner support for breastfeeding.

Partner support for breastfeeding has been found to be a predictor of breastfeeding outcomes. In a study by Mok et al. (2008), women who perceived support for breastfeeding from the father of the baby were more likely to breastfeed. This was also found in the literature review by Dennis, (2002). Furthermore, the literature review found that women whose partner supported breastfeeding had a longer duration of breastfeeding. The effect on duration was also observed by Mok et al. (2008). The effect of partner support on breastfeeding exclusivity at six months has not been researched and requires closer examination.

Social support.

Similar to the positive influence of partner support , the maternal social network has been found to have a positive predictive influence on breastfeeding outcomes. Sheehan et al. (2001 & 2006) reported that mothers who expected to use a mother's group or drop-in center after discharge from the hospital were less likely to discontinue breastfeeding before four weeks. Similarly, in a grounded theory, qualitative study (n = 17) by Locklin et al. (1995) multiparas women stated that they were unable to successfully breastfeed prior children because they did not have a social support system that encouraged their breastfeeding attempts. This view into the lives of breastfeeding mothers has been supported by quantitative studies such as an Australian study that

showed mothers who reported having high social support for their breastfeeding were more likely to be breastfeeding at one week (p <.001) (Blythe et al., 2004). The same authors reported mothers who were exclusively breastfeeding reported higher levels of perceived support (p = .008). Consistent with the previous authors, the literature review by Dennis (2002) found that women who had support from their social network, including friends who had breastfed, had better breastfeeding outcomes.

The experience of seeing how others feed their babies has also been found to impact breastfeeding outcomes. Mok et al. (2008) found that women were influenced to breastfeed from their family feeding practices. Women who came from families who predominantly bottle fed were more likely to do the same. The impact of social support on breastfeeding outcomes can have a profound effect; however, more research is needed in the area of whether it continues to have an impact on exclusivity at six months.

Socio-Demographic Predictors of Breastfeeding Outcomes

A large number of socio-demographic factors have been identified in the literature. These include birth weight, maternal immigration, maternal education, income, marital status, employment and maternity leave, age, and urbanization. While many of these predictors have been found to affect initiation and duration, few have been studied to determine their impact on exclusivity.

Birth weight.

Three studies have reported that birth weight has an impact on breastfeeding. Grossman, et al. (1990), found that babies who were breastfed had higher birth weights. Liubai et al. (2003), looked at duration of breastfeeding and found an inverse relationship between birth weight and early cessation. Lande et al. (2003), addressed exclusivity and

found that there was no association between birth weight and exclusive breastfeeding at four months; however, at six months, as the birth weight decreased, the odds of breastfeeding decreased.

Maternal immigration

In the literature review which focused on developed countries regarding predictors of initiation and duration (Dennis, 2002), women who had immigrated to the United States more recently were more likely to breastfeed. Similarly, the analysis of the 2003 Canadian Community Health Survey showed that immigrant women in Canada are 2.12 times more likely to initiate breastfeeding than those who were born in Canada (Millar & Maclean, 2005). The effect of immigration on duration of breastfeeding has also been illustrated in an Ontario study (Sheehan et al., 2006). Analysis of the Ontario Mother and Infant Survey II showed that women who were born outside of Canada were less likely to discontinue breastfeeding duration prior to four weeks postpartum. The limitation with each of these studies is that the length of maternal residence in the United States or Canada was not quantified, making it difficult to compare to each other and with other future studies.

Maternal education.

Maternal education has been found to be a predictor for breastfeeding outcomes. Three studies have reported that as maternal education increases, so do initiation rates of breastfeeding (Grossman et al., 1990; Hilson et al., 1997; Millar & Maclean, 2005). In an American study (Hilson et al., 1997), with a large sample size (n=1109) researchers found that women who had more education were more likely to attempt to breastfeed at delivery (p = 0.0001). Similarly, a Canadian study (Millar & Maclean, 2005) found that

those mothers who had a postsecondary education were 3 times more likely to initiate breastfeeding. The duration of breastfeeding has also been found to be impacted by maternal education level (Donath & Amir, 2000; Grossman et al., 1990; Kehler et al., 2009; Lande et al., 2003; Liubai et al., 2003; Sheehan et al., 2001). Each study indicates that as maternal education increases, breastfeeding duration also increases. In yet another Canadian study, maternal education less than 12 years was found to be an independent risk factor for early cessation of breastfeeding prior to six months (OR = 2.16) (Kehler et al., 2009). There has only been one study found in which maternal education level impacted the prevalence of breastfeeding exclusivity (Millar & Maclean, 2005). The study found that mothers who had a postsecondary degree were 1.46 times more likely to be exclusively breastfeeding at six months.

Income.

Income has also been identified as a predictor of breastfeeding outcomes. One literature review (Dennis, 2002) and two studies (Grossman et al., 1990; Millar & Maclean, 2005) have indicated that income is a predictor of breastfeeding initiation. A limitation of the literature review by Dennis is that household income, level of education and occupation are grouped together as a variable. This makes it difficult to determine which predictor is having the impact on breastfeeding initiation. The Canadian study (Millar & Maclean, 2005), found that women who were in the upper-middle and highest income categories were more likely to initiate breastfeeding.

In addition to initiation, duration of breastfeeding is also impacted by income. One literature review (Dennis, 2002) and one study (Donath & Amir, 2000) found that women with a higher household income breastfed for longer. According to Donath &

Amir (2000), those women who were in the lowest quintile for socio-economic status were less likely to be breastfeeding at hospital discharge and were also least likely to still be breastfeeding at 25 weeks when compared to those mothers in the socio-economically advantaged quintiles. The Canadian study by Millar and Maclean (2005), also found that household income had an impact on breastfeeding exclusivity, with those in the upper-middle and highest income categories more likely to exclusively breastfeed for six months. A limitation with these studies is that income is categorized differently, making it difficult to compare to one another and to future studies.

Marital status.

Marital status has been identified as a predictor of breastfeeding initiation and exclusivity of breastfeeding. Grossman et al. (1990) found that marriage was positively associated with the decision to breastfeed. Similarly, Millar and Maclean (2005) found that women who were married were 1.22 times more likely to initiate breastfeeding. In a study by Lande et al. (2003), mothers who were cohabitating with a partner and not married were less likely to be exclusively breastfeeding at 4 months. Similarly, a systematic review found that women who were married were less likely to introduce foods prior to six months (Wijndaele et al., 2009). With the changing landscape of family composition, additional research in the area of this predictor would be beneficial.

Employment and maternity leave

The decision for a mother to return to work within the first year of the baby's life, and the act of returning to work in the first year have been cited as having an impact on breastfeeding outcomes. There is literature that addresses initiation rates; however, the evidence is weak and conflicting. In the literature review by Dennis (2002), a mother`s

intention to return to work was not associated with her initiation with breastfeeding. In contrast, the study by Millar and Maclean (2005) reported that 5% of mothers who did not initiate breastfeeding did so because they were returning to work. There were no statistical analyses conducted to determine if this was statistically significant.

The impact of employment on duration of breastfeeding has been documented in both qualitative and quantitative studies. A qualitative study composed of two focus groups was done to determine what were the perceived barriers to breastfeeding that exist in Northern Ireland (Stewart-Knox, Gardiner & Wright, 2003). There were four main themes that emerged: social, psychological, environment, and practical. The practical theme revealed that returning to work would make breastfeeding too difficult. While the study did not measure the women`s initiation or duration of breastfeeding, it can be implied that this perception would have an impact on breastfeeding outcomes. Supporting these results are quantitative studies that have addressed the predictor of employment and duration of breastfeeding. Three studies in the literature review by Dennis (2002), reported that the act of returning to work decreased the duration of breastfeeding. The authors also reported that the time a mother received for maternity leave had a positive correlation to breastfeeding duration. Similarly, a literature review by Staehelin, Bertea & Stutz (2007), identified four studies that showed a correlation between maternity leave and breastfeeding duration. Each study also consistently indicated that the longer maternity leaves increased breastfeeding duration. These results were also found in a study of Canadian mothers after the new implementation of the one year maternity leave mandate (Baker & Milligan, 2008). The authors found that after the maternity leave increased from six months to one year, breastfeeding duration increased

by one month for those women who had been eligible for the paid leave. It was also found that exclusive breastfeeding increased by half a month and that the number of women who exclusively breastfed to six months increased by 7.7 %. In another Canadian study, working full-time or intending to within the first year was considered an independent risk factor early cessation of any breastfeeding (Kehler et al., 2009). In contrast to Baker and Milligan, Kehler et al, suggest that the monetary supplement for the one year maternity leave in Canada is not enough financial support for some women to stay home (p 378).

Urbanization.

Urbanization refers to the effect of living in a populated place on breastfeeding. Geographic location has been identified as a predictor for breastfeeding outcomes. In the Canadian analysis of the 2003 Canadian Community Health Survey, the geographic location of women impacted initiation rates (Millar & Maclean, 2005). Women in urban areas initiated breastfeeding more frequently and women in Ontario and the western provinces had higher initiation rates than those in Atlantic Canada and Quebec. Comparably, in a Norwegian survey, mothers were more likely to exclusively breastfeed until four months if they resided in an urban setting with greater than 100 000 people (Lande et al., 2007).

Age.

Maternal age has overwhelmingly been identified as a predictor of breastfeeding outcomes. One literature review (Dennis, 2002), one systematic review (Wijndaele et al., 2009) and seven studies (Blythe et al., 2004; Donath, & Amir 2000; Grossman et al., 1990; Hilson et al., 1997; Kehler et al., 2009; Lande et al., 2003; Millar & Maclean,

2005) have found that as maternal age increases, breastfeeding initiation and duration also increase. One Canadian study identified that maternal age also impacted exclusivity of breastfeeding (Millar & Maclean, 2005), with those above 25 having a higher incidence of exclusive breastfeeding than those under 25.

Number of live births.

The number of live births that a woman has had, has been shown to impact breastfeeding outcomes in four studies (Blythe et al., 2004; Chalmers et al., 2009; Falceto et al., 2004; Lande et al., 2003). In a preliminary analysis of the Maternity Experiences Survey by Chalmers et al. (2009), women who were mothers for the first time were more likely to initiate breastfeeding; however, multiparas breastfed for a longer duration and had a higher incidence of exclusivity. Similarly, an Australian study by Blythe et al. (2004) found that women who had breastfed a previous child were 2.27 times more likely to be breastfeeding at four months than those with no experience. A Brazilian study also found that the firstborn was less likely to be breastfed at 4 months ($p = 0.015$) (Falceto et al., 2004). Similarly, the Norwegian study by Lande et al. (2003), found that mothers who had more than 2 children were more likely to be exclusively breastfeeding at 4 months and breastfeeding at 6 months. Interestingly neither of the two previous studies clarify if it is a woman's previous experience with breastfeeding, or just the number of children that she has had that is having an impact on breastfeeding outcomes.

Conclusion

A large number of predictors have been identified in the literature that impact breastfeeding outcomes. Unfortunately, many of these variables have not been tested to determine if they have an impact on breastfeeding exclusivity at six months. Equally, a

large number of variables have not been studied to determine their effect on breastfeeding initiation. Currently, limited research exists pertaining to the predictors of early cessation of exclusive breastfeeding prior to six months. By investigating the previously identified predictors, this study aimed to provide a comprehensive picture of the predictors that are impacting both initiation and exclusivity of breastfeeding at four and six months postpartum in the Canadian population. The research questions derived from this literature review are as follows:

Research Questions

1. Are there prenatal maternal experiences that may be predictors of breastfeeding initiation?
2. Are there maternal experiences from the intrapartum period that may be predictors of breastfeeding initiation?
3. Are there socio-demographic factors that may be predictors of breastfeeding initiation?
4. Are there prenatal maternal experiences that may be predictors of early cessation of exclusive breastfeeding prior to six months of age?
5. Are there maternal experiences from the intrapartum period (labour and birth) that may be predictors of early cessation of exclusive breastfeeding prior to six months of age?
6. Are there postpartum maternal experiences that may be predictors of early cessation of exclusive breastfeeding prior to six months of age?
7. Are there socio-demographic factors that may be predictors of early cessation of exclusive breastfeeding prior to six months of age?

CHAPTER III

Design and Methodology

Research Design

A retrospective, correlational study utilizing data from the Maternity Experiences Survey (MES) was conducted to identify the predictors of breastfeeding initiation and early cessation of breastfeeding exclusivity at six months. The Maternity Experiences Survey is the first Canadian survey that encompasses women's experiences of pregnancy, labour, delivery and the postpartum time period (PHAC, 2009). The survey was developed through Public Health Agency of Canada by the Maternity Experiences Study Group. It is a cross sectional design constructed from the 2006 Canadian Census of Population. The objective of this survey was to collect data that could enhance the health outcomes of both mothers and babies in Canada. The study group focused on collecting perinatal health indicators like delivery of health care during the pregnancy, labour and delivery practices, health of the newborn, breastfeeding practices, mother's perceptions of their postpartum health care and other factors that have impacted a mother's maternity experiences i.e. demographics, support systems, stressors.

The target population for this survey (PHAC, 2009) included:

- Mothers who gave birth between the 15th of February and the 15th of May 2006 (provinces) or between the 1st of November 2005 and the 1st of February, 2006 (territories)
- Mothers who had a single birth
- Mothers who were at least 15 years of age at the time of baby's birth. Due to operational reasons, mothers less than 15 were excluded.

- Mothers whose baby was born in Canada and lived with the mother at least one night per month
- Mothers who lived on First Nations reserves and in collective dwellings were excluded due to operational reasons.

A pilot study comprising 210 mothers was conducted in 2005 by Statistics Canada. Telephone, computer assisted interviews were conducted, with interviews lasting on average 45 minutes (PHAC, 2009). Observations made during the pilot study were used to revise the MES. Data collection occurred in October of 2006 with 8,542 mothers being contacted for the MES. The response rate was 78%, making the unweighted sample size 6,421 mothers. Computer assisted telephone interviews were conducted for the most part. Occasionally in the territories this was not available. In these cases a personal interview was conducted on paper. This was done for almost 30 respondents.

The computer assisted interview was designed to decrease errors during data collection (PHAC, 2009). Even so, there were some records with errors that were identified. When questions were answered that should not have been answered by a particular respondent, the computer automatically eliminated the data based on answers from previous questions. The computer also detected questions that should have been answered. In this case the "non response or "not stated' code was assigned.

Access to the Data Set

The MES is a microdata set that is available through the Research Data Centre (RDC) initiative by Statistics Canada, the Social Sciences and Humanities Research Council (SSHRC) and Canadian universities, including the University of Windsor

(Statistics Canada, 2009). The purpose of the RDCs is to enable researchers to gain access to confidential microdata from Canadian surveys for the purpose of analysis and interpretation. Only those who have been approved by Statistics Canada may gain access to the data. In order to gain access to the MES, a project proposal was submitted on-line to Statistics Canada and SSHRC. The application process also requires that the Master's student and each of the thesis committee members register their CVs on the SSHRC website. Furthermore, a letter of support was written by the thesis committee chair in support of the proposed project.

After the proposal was approved, the student researcher was required to sign a contract with Statistics Canada that allows access only to the MES and only for the purpose of completing the analyses outlined in the project proposal (Statistics Canada, 2009).

Upon completion of the project a copy of the final thesis will be submitted to Statistics Canada to conclude contractual obligations (Statistics Canada, 2009).

Ethics

The initial Maternity Experiences Survey received approval through the Health Canada Research Ethics Board. Prior to initiating the data analysis for this study, approval from the University of Windsor Research Ethics Board was achieved.

Data Analysis

The purpose of the study is to determine the predictors of breastfeeding initiation and early cessation of exclusive breastfeeding at six months. All data analyses was conducted at the University of Windsor Research Data Center (RDC) located in the

Leddy Library. The data analysis was conducted using SPSS 19.0. This software is available for use in the RDC at the University of Windsor.

The dependent variables in the study were breastfeeding initiation and breastfeeding exclusivity at six months. Breastfeeding initiation was determined by the mother's behaviour of initiating breastfeeding, even if it was only for a short while. Breastfeeding exclusivity was determined based on three questions from the MES about breastfeeding initiation and the introduction of solids and/or liquids to the infant's diet. If solids or liquids were added before six months, then it would be categorized as not exclusively breastfed. If nothing was added, then the variable would be categorized as exclusive.

The independent predictors were those that have been identified previously in the literature review. These include: Body mass index, maternal smoking, attendance at childbirth classes, depression, adequacy of breastfeeding information, adequacy of formula feeding information, mode of delivery, use of labour analgesia, labour support, birth weight, baby friendly hospital initiatives, infant health, maternal health, professional support within the community, number of live births, social support, maternal immigration maternal education, income, marital status, employment and maternity leave, urbanization and age.

To determine the predictors of early cessation of exclusive breastfeeding, multivariate logistic regression was used. Initially, univariate statistical analyses were performed to identify unadjusted predictors. Independent t-tests were conducted for independent variables that were continuous. In these analyses breastfeeding exclusivity was the independent variable, with the predictors mentioned in the literature review as the

dependent variables. Chi-square was used for independent variables that are categorical. Mann Whitney U was used for ordinal variables. Each variable that had a significant relationship with exclusive breastfeeding at six months ($p \leq .25$) in the univariate analyses were included in a multivariate logistic regression analysis to identify the independent predictors of exclusive breastfeeding at six months. (Hosmer & Lemshow, 2000). The same steps were conducted to identify predictors for the outcome variable of breastfeeding initiation.

Limitations

Limitations for this study stem from both the data set being used and from the techniques of secondary analysis. Some of the limitations of the Canadian Maternity Experiences Survey include the lower limit on maternal age, the exclusion of mothers who had multiple births and the exclusion of Aboriginal women living on a reserve. Each of the excluded groups could have an impact on breastfeeding initiation and exclusivity. Another limitation of many of the questions on the MES is that mothers may not feel comfortable answering honestly for fear of repercussions from the interviewer.

In addition, mothers were sampled between five and fourteen months postpartum. Many of the questions related to the prenatal and intrapartum information. The length of time between the prenatal period and the earliest sampled respondent was at least five months. This lengthy time period could affect respondent recall, biasing the results.

Another limitation of conducting a secondary analysis of a survey is that the researcher does not have the ability to ask questions that they feel may have been missed in the original survey. While the MES contains a large number of variables, there remain a number of potential predictors that were not addressed.

Chapter IV

Results

This chapter describes details of data screening and results from the data analysis.

Data Screening

The results from the Maternity Experiences Survey (MES) were screened and analyzed using the Statistical Package for the Social Sciences (SPSS), version 19. The data was screened for missing data, normality, univariate outliers, multicollinearity, multivariate outliers and linearity in the logit.

The first step in screening the data was to determine the accuracy of the missing data that had been categorized as valid skips. Each variable that had the possibility of being skipped due to a response on a previous question was screened for accuracy. Each variable that consisted of valid skips was determined to have the accurate number of valid skips. Each variable was then assessed for missing data. All variables had less than 5% missingness, with the exception of income which was 5.8%. According to Tabachnick & Fidell (2006, p. 63) " If only a few data points, say 5% or less, are missing in a random pattern from a large data set, the problems are less serious and almost any procedure for handling missing values yields similar results". Due to the small number of missing data per variable and the large sample size (weighted N=4416), listwise deletion was the technique chosen to handle the missing data for the logistic regression. Listwise deletion is the default option for SPSS and drops any case that has a missing value in any variable. This can be beneficial because "it allows all analyses to be conducted on the same number of cases" (El-Masri & Fox-Wasylyshyn, 2005, p. 163).

The income variable had 5.8% missingness. Because the missingness exceeded 5%, the pattern of missingness was assessed. Alcock suggests using logistic regression with a missing data dummy variable as the dependent variable, and all the other variables in the data set as the independent variables (as cited by El-Masri & Fox-Wasylyshyn, 2005, p. 162). Therefore, a missing data dummy variable was created and used as the dependent variable in a logistic regression, with all the other variables from the data set as independent variables. The results of the logistic regression showed that the missing data on the income variable was not missing completely at random (MCAR). Listwise deletion was chosen as the technique for handling the missing data for the income variable because the percentage of missingness was only slightly greater than 5%. The limitation to including the income variable and utilizing the listwise deletion technique for the missing data could be an inflation or deflation of the parameter estimates which may lead to biased results (El-Masri & Fox-Wasylyshyn, 2005, p. 164). This technique was also used by Chalmers et al. (2009) in their analysis of the income variable in the MES.

Each continuous variable was then assessed for outliers using z-scores. Z-scores greater than 3.29 are considered outliers (Field, 2005, p. 79). Six of the seven continuous variables had outliers greater than a z-score of 3.29. Initially the researcher attempted to transform the variables; however, the outliers remained above 3.29. The next step taken was to handle the outliers by imputing the outlier with the highest acceptable number plus one (Field, 2005, p. 79). This step was carried out for the variables: prepregnancy BMI, length of stay, age of the baby when the mother returned to work, Edinburgh Postnatal

Depression Scale, weight of the baby in pounds and the number of live births. The maternal immigration variable did not have any outliers and remained unchanged.

All continuous variables were assessed for normality after the outliers were imputed using an absolute skewness less than 3 and an absolute kurtosis less than 10 (Kline, 2011, p. 63). Six of the continuous variables (BMI, length of stay, maternal immigration, Edinburgh Postnatal Depression Scale, weight of the baby in pounds and the number of live births) met the assumption of normality. One variable, age of the baby when the mother returned to work, remained slightly skewed (absolute skewness = 3.102, absolute kurtosis = 8.804). The skewness is present because most mothers had not returned to work at the time of the survey and therefore were coded as a zero. Because independent t tests are robust to the violation of normality (Sullivan & D'Agostino, 1992), this variable was not changed any further.

Mulitvariate outliers were assessed using Mahalanobis' distance and Cook's distance. The Mahalanobis distance was assessed using the chi-square distribution, where any case that exceeded the critical value (df = number of independent variables) at $p < .001$ was considered to be a multivariate outlier. This test did reveal that some multivariate outliers existed. To assess whether these outliers were influential Cook's distance was assessed. A case is deemed to be an influential data point if Cook's distance is ≥ 1 (Fields, 2005, p. 200). All cases had a Cook's distance that was less than 1, therefore, no influential multivariate outliers were found in the analysis.

Multicollinearity was assessed using two collinearity diagnostics: Tolerance and the Variance Inflation Factor (VIF). The tolerance diagnostics did not reveal any values < .1, indicating that no multicollinearity exists (Fields, 2005, p. 175). Myers has

indicated that a VIF value greater than 10 indicates multicollinearity (as cited by Fields, 2005, p. 175). The VIF diagnostics did not show any values greater than 10, indicating again that multicollinearity was absent.

The linearity in the logit was also assessed. Linearity in the logit is an assumption of logistic regression in which "a linear relationship between continuous predictors and the logit transform of the DV" (Tabachnick & Fidell, 2006, p 443). Interactions between the natural logarithm of all continuous variables and the continuous variables themselves were entered into the logistic regression models for breastfeeding initiation and exclusive breastfeeding at six months. Each interaction was found to be non significant, indicating that linearity in the logit existed (Tabachnick & Fidell, 2006, p 443)

Data Analysis

Utilizing data from Statistics Canada in a Research Data Centre requires that all analyses are done with population weights. The weights are provided by Statistics Canada with the MES and were used for all analyses. Data analysis was also performed using a two tailed alpha of 0.5 and a beta of .80.

Analysis was completed for breastfeeding initiation and exclusivity at six months to determine the predictors of mothers' breastfeeding choices. The exclusion criteria included all newborns who were admitted to a neonatal intensive care unit, and prematurity (born at less than 37 weeks gestation). Analysis was done for breastfeeding initiation and breastfeeding exclusivity at six months. To determine the predictors of breastfeeding initiation and of early cessation of exclusive breastfeeding at six months, multiple logistic regression was used. Initially, univariate statistical analyses were performed to identify unadjusted predictors. Chi-square analyses were used for

independent variables that were nominal (Tables 1 and 2), Mann-Whitney U was used for variables that were ordinal (Tables 3 and 4), and Independent t-tests were conducted for independent variables that were continuous (Tables 5 and 6). Each variable that had a significant relationship with the dependent variables ($p \leq .25$) in the univariate analysis were included in a logistic regression to identify the independent predictors of mothers' breastfeeding choices (Hosmer & Lemshow, 2000).

The majority of predictors included in the logistic regression were chosen based on theoretical reasoning. Either they were found through the literature review, or in the case of a small number of predictors, they were included based on clinical experience. Based on the theoretical reasoning behind the inclusion of each predictor, a forced entry (or direct) approach for logistic regression was used, in which all predictors are entered into the model at the same time (Field, 2005, p 160). Field recommends that this approach be used when there is theoretical reasoning behind the inclusion of the predictors in the model (2005, p 160). Tabachnick and Fidell, also recommend forced entry over stepwise logistic regression for theory guided analyses by saying that "the practice of basing decisions on data-driven, rather than theory-driven models is especially hazardous in logistic regression, with its frequent application to life-and-death biomedical issues" (2006, p 456). Each variable is discussed in relation to the literature in the discussion section in Chapter five.

Definition of Dependent Variables

The two dependent variables were breastfeeding initiation and exclusive breastfeeding at six months. The variable used for breastfeeding initiation was a single

question that had been asked on the MES. Breastfeeding initiation included all women who attempted to initiate breastfeeding even if it was only for a short time.

Breastfeeding exclusivity at six months was determined based on two questions from the MES about the introduction of solids and liquids to the infant's diet. If solids or liquids were added before six months, then the child was categorized as not exclusively breastfed. If nothing was added, then the variable was categorized as exclusive. Those women who did not initiate breastfeeding were not included in the variable.

Definition of Recoded Independent Variables

Due to the sensitivity of this statistics Canada data, any data analysis with cells that had less than ten cases per cell cannot be released for confidentiality reasons. To meet these requirements, a number of variables were recoded that had cells with less than ten cases. Five variables had to be dropped from the analyses due to these restrictions: maternal drug use, use of fertility medications or procedures, mother's main activity during pregnancy, facility type for the birth, and ethnicity. All variables, and their coding, can be found in Appendix A.

The predictor that looked at prenatal education classes was recoded to only include women who had not previously been pregnant. Typically women do not attend prenatal education classes during their subsequent pregnancies, therefore the predictor was adjusted so as not to skew the results with multiparous women.

The predictor which addresses the mother having a husband or partner present during the labour was recoded due to certain cells with less than ten cases. Both not having a husband/partner present and not having a husband or partner were collapsed into one response.

The predictor for marital status was also recoded due to cells with less than ten cases. These responses were collapsed into three categories: married, living common-law, and single (never married, widowed, separated or divorced). The categories for single (never married), widowed, separated and divorced were collapsed together due to small cell counts in each original category.

An attempt was made to recode the provinces and territories in which the mother resided; however, all the territories combined remained with less than ten cases and had to be excluded from the analysis. The Atlantic provinces were collapsed into one category due to cells with less than 10 cases.

The predictor of aboriginal status originally was only asked of women who were born in Canada, the United States of America and Greenland. The variable was recoded to include all of the respondents, with any woman who was not born in the three preceding countries added to the negative response for aboriginal status.

The predictor looking at the type of healthcare provider was collapsed from two questions into one. Obstetricians and Gynecologists were collapsed into the response of OBGYN and family physicians and general practitioners were collapsed into one response. Midwife, nurse practitioner (NP), registered nurse (RN) and an "other" response were collapsed into one category due to small cell counts.

Variables Analyzed

A total of fifty variables were analyzed in relation to breastfeeding initiation and exclusive breastfeeding at six months:

- Prenatal education for primiparous women
- Adequate breastfeeding
- Aboriginal status
- Healthcare provider for prenatal care

information
- Adequate formula feeding information
- Type of delivery
- Planned caesarean
- Unplanned caesarean
- Use of epidural
- Use of pain killing medications
- Use of gas breathed through a mask
- Husband or partner with mother during labour
- Companion presence during labour or birth
- Assistance or an offer of assistance given to initate breastfeeding from health care providers
- Free formula samples given or offered by health care providers
- First time holding baby he/she was naked
- First time holding baby was against the mother's naked skin
- Location of the baby during the first hour after birth
- Marital status
- Province in which the baby was born
- Prepregnancy BMI
- Maternal immigration
- Birth weight
- Number of live births
- Community breastfeeding support resources given by healthcare providers
- Use of pacifier during the first week after birth
- Length of stay
- Mother returned to work since the birth of the baby
- Age of the baby when mother returned to work
- Mother born in Canada
- Maternal smoking
- Mother's perception of labour
- Maternal satisfaction with support from husband or partner during labour
- Maternal satisfaction with support from companion during labour and birth
- Length of time after delivery until mother first held her baby
- Length of time baby was in a different from than the mother in the first 24 hours
- Mother's highest level of education
- Population of the area that the mother lives in
- Total income of all household members in the last 12 months
- Age of the mother at the time of birth
- Maternal perception of her stress level in the 12 months preceding the birth of the baby
- Frequency of alcohol consumption during pregnancy
- Feeding patterns in the first week
- Infant health since birth
- Maternal health since birth
- Contacted by a healthcare provider at home to check on the health of the baby and mother
- Length of time until the baby was first put to breast
- Maternal breast pain in the first three months
- Frequency of support available to mom when needed since the birth
- Edinburgh Postnatal Depression Scale

When conducting the univariate analyses for the predictors of breastfeeding initiation, twelve predictors were not used based on the time-frame of when the variables would impact a mother's maternity experience. Those that would occur after the period of initiation were not included, they were: community breastfeeding support resources given by healthcare providers, use of a pacifier during the first week after birth, feeding patterns in the first week, infant health since birth, maternal health since birth, contacted by a healthcare provider at home to check on the health of baby and mother, length of time until the baby was first put to breast, maternal breast pain in the first three months, frequency of support available to mom when needed since the birth, length of stay, and mother returned to work since the birth of the baby, and age of the baby when the mother returned to work.

The second research question was to determine the predictors of exclusive breastfeeding at six months. All 50 predictors were used in the univariate analyses.

Results for the Chi Square Analyses

Chi Square analyses were conducted on all nominal variables. The Chi Square analyses revealed that nineteen of the twenty-one variables were significant for breastfeeding initiation ($p \leq .25$), and twenty of the twenty-eight variables were significant for exclusive breastfeeding at six months. The results for the Chi Square analyses are reported in Table 1 and 2.

Table 1

Chi Square Analysis of Nominal Variables for Breastfeeding Initiation

Variable Name	No. of Mothers who Initiated Breastfeeding	No. of Mothers who did not Initiate Breastfeeding	Chi-Square	*P*
Prenatal education for primiparous women				
Yes	1240	49	61.14	<.001**
No	574	74		
Adequate information received about breastfeeding.				
Yes	3763	318	105.39	<.001**
No	247	81		
Adequate information about formula feeding				
Yes	3107	366	39.76	<.001**
No	885	35		
Type of birth				
Vaginal	3049	297	.73	.394
Caesarean	964	104		
Planned caesarean				
Yes	497	65	4.79	.029**
No	3515	336		
Unplanned caesarean				
Yes	467	362	1.32	.251*
No	39	3545		
Epidural used by women who had/attempted to have a vaginal birth .				
Yes	1576	173	2.25	.134*
No	2434	228		
Pain killing meds used by women who had/attempted to have a vaginal birth				
Yes	592	68	1.42	.233*
No	3376	328		
Gas breathed through a mask use by women who had/attempted to have a vaginal birth	656	52	3.18	.075*
Yes	3344	349		
No				

Husband or partner with mother during labour				
Yes	3741	356	10.99	.001
No	271	45		
Companion presence during labour or birth				
Yes	1416	145	.12	.732
No	2595	256		
Assistance or an offer of assistance given to initiate breastfeeding from healthcare providers				
Yes	3369	178	358.04	<.001**
No	633	219		
Free formula samples given or offered by healthcare providers	1199	264	212.75	<.001**
Yes	2802	136		
No				
First time holding baby, he/she was naked				
Yes	1937	164	8.12	.004
No	2032	233		
First time holding baby was against the mother's naked skin	1833	116	43.79	<.001**
Yes	2121	283		
No				
Location of baby during the first hour after birth				
In bed with mother	1869	133		
In same room, but not in mother's bed	1587	203	27.20	<.001**
In a different room than mother	537	64		
Marital status				
Married	2774	202		
Living common-law	910	148	57.53	<.001**
Widowed, separated, divorced, single	315	48		
Province in which the baby was born				
Atlantic Provinces	202	50		
Quebec	925	126		
Ontario	1537	163	89.63	<.001**

Manitoba	143	13		
Saskatchewan	131	10		
Alberta	523	27		
British Columbia	531	12		
Aboriginal status				
Yes	158	24	3.81	.051*
No	3853	378		
Healthcare provider for prenatal care				
OBGYN	2297	249	11.44	.003**
Family physician/GP	1376	133		
Midwife/NP/RN/other	307	13		
Mother born in Canada				
Yes	2964	373	72.423	<.001**
No	1048	28		

OBGYN – Obstetrician and Gynecologist, GP – General Practitioner, NP – Nurse Practitioner, RN – Registered Nurse

Note. A dash is used in place where the variable was not analyzed.

*significant at $p \leq .25$

**significant at $p \leq .05$

Table 2

Chi Square Analysis of Nominal Variables for Exclusive Breastfeeding at Six Months

Variable Name	No. of Mothers who Exclusively Breastfed until Six Months	No. of Mothers who did not Exclusively Breastfeed until Six Months	Chi-Square	*P*
Prenatal education for primiparous women				
Yes	177	900	19.01	<.001**
No	53	443		
Adequate information received about breastfeeding.				
Yes	562	2726	.70	.403
No	32	183		
Adequate information about formula feeding				
Yes	405	2331	41.34	<.001**
No	186	566		
Type of birth				
Vaginal	471	2207	3.36	.067*
Caesarean	123	705		
Planned caesarean				
Yes	69	355	.15	.695
No	525	2557		
Unplanned caesarean				
Yes	53	349	4.56	.033**
No	541	2563		
Epidural used by women who had/attempted to have a vaginal birth .				
Yes	218	1170	2.55	.110*
No	376	1739		
Pain killing meds used by women who had/attempted to have a vaginal birth				
Yes	71	447	4.67	.031**
No	518	2430		
Gas breathed through a mask use by women who had/attempted to have a vaginal birth	99	469	.10	.751
Yes	494	2432		

No				
Husband or partner with mother during labour				
Yes	561	2701	2.10	.147*
No	33	210		
Companion presence during labour or birth				
Yes	199	1042	1.15	.284
No	395	1868		
Assistance or an offer of assistance given to initiate breastfeeding from healthcare providers	490	2458	1.77	.183*
Yes	104	445		
No				
Free formula samples given or offered by healthcare providers	123	924	28.02	<.001**
Yes	467	1982		
No				
Community breastfeeding support resources given by healthcare providers				
Yes	514	2497	.20	.656
No	78	402		
Pacifier used during the first week after birth				
Yes	130	1313	109.89	<.001**
No	461	1586		
Feeding pattern in the first week	63	477		
Fixed schedule	342	1475	15.15	.001**
On demand	187	927		
Combination of both types				
First time holding baby, he/she was naked				
Yes	332	1373	15.34	<.001**
No	255	1506		
First time holding baby was against the mother's naked skin	313	1305	12.23	<.001**
Yes	273	1563		
No				
Location of baby during the first hour after birth				

In bed with mother	333	1305		
In same room, but not in mother's bed	205	1180	26.54	<.001**
In a different room than mother	55	411		
Baby has needed to see a physician for reasons other than routine visits				
Yes	275	1416	1.07	.300
No	319	1496		
Mother has needed to see a physician for reasons other than routine visits				
Yes	162	806	.05	.833
No	432	2104		
Contacted by healthcare provider at home to inquire about mother and baby's health				
Yes	566	2703	4.44	.035**
No	28	206		
Marital status				
Married	479	1937		
Living common-law	89	707	46.98	<.001**
Widowed, separated, divorced, single	24	256		
Province in which the baby was born				
Atlantic Provinces	22	148		
Quebec	97	719		
Ontario	246	1087	24.11	<.001**
Manitoba	23	96		
Saskatchewan	24	96		
Alberta	80	379		
British Columbia	95	373		
Aboriginal status				
Yes	19	117	.89	.346
No	575	2795		
Healthcare provider for prenatal care				
OBGYN	310	1696	35.05	<.001**
Family physician/GP	199	1005		
Midwife/NP/RN/other	80	188		
Mother has returned to work				

since the birth of the baby				
Yes	69	431	4.04	.044**
No	522	2471		
Mother born in Canada				
Yes	411	2166	6.82	.009**
No	183	746		

OBGYN – Obstetrician and Gynecologist, GP – General Practitioner, NP – Nurse Practitioner, RN – Registered Nurse

Note. *significant at $p \leq .25$

**significant at $p \leq .05$

Results for the Mann Whitney U Analyses

Mann Whitney U analyses were conducted on all variables that were ordinal. The Mann Whitney U analyses revealed that ten of the twelve variables were significant for breastfeeding initiation ($p \leq .25$), and ten of the fifteen variables were significant for exclusive breastfeeding at six months. The results for the Mann Whitney U analyses are reported in Tables 3 and 4.

Table 3

Mann Whitney U Analysis of Ordinal Variables for Breastfeeding Initiation

Variable Name	Median	*U*	*Z*	*P*
Smoking during the last three months of pregnancy	3	520419.50	-10.42	<.001**
Mother's perception of labour and delivery	5	608949.00	-1.28	.200*
Maternal satisfaction with support from husband/partner during labour	1	611971.50	-1.33	.184*
Maternal satisfaction with support from companion during labour and birth	0	627148.50	-.34	.735
Length of time after delivery until mother first held her baby	1	608832.50	-1.46	.144*
Length of time baby was in a different room than the mother in the first 24 hours	1	545905.50	-4.95	<.001**
Mother's highest level of education	6	441113.00	-9.134	<.001**
Population of the area that the mother lives in	4	503980.00	-4.83	<.000**
Total income of all household members in the last 12 months	8	490535.00	-3.47	.001**
Age of mother at the time of birth	4	584157.50	-2.43	.015**
Maternal perception of her				

stress level in the 12 months preceding the birth of the baby	2	630088.00	-.30	.765
Frequency of alcohol consumption during pregnancy	1	618454.00	-1.49	.137*

Note. A dash is used in place where the variable was not analyzed.
* significant at $p \leq .25$
**significant at $p \leq .05$

Table 4

Mann Whitney U Analysis of Ordinal Variables for Exclusive Breastfeeding at Six Months

Variable Name	Median	*U*	*z*	*P*
Smoking during the last three months of pregnancy	3	679427.50	-4.63	<.001**
Mother's perception of labour and delivery	5	678304.00	-2.389	.017*
Maternal satisfaction with support from husband/partner during labour	1	719547.00	-.30	.768
Maternal satisfaction with support from companion during labour	0	707161.00	-1.09	.277
Length of time after delivery until baby was first put to breast	3	616833.50	-5.41	<.001**
Length of time after delivery until mother first held her baby	1	660641.50	-4.18	<.001**
Length of time baby was in a different room than the mother in the first 24 hours	1	664752.00	-3.20	.001**
Maternal breast pain in the first 3 months	2	668064.00	-3.12	.002**
Frequency of support available to mother when needed, since the birth	5	685273.50	-2.19	.029**
Mother's highest level of education	6	572060.00	-7.25	<.001**
Population of the area that the mother lives in	4	655260.00	-.95	.344
Total income of all household members in the last 12 months	8	574433.50	-4.28	<.001**
Age of mother at the time of birth	4	580794.50	-7.57	<.001**
Maternal perception of her stress level in the 12 months preceding the birth of the baby	2	719049.00	-.42	.676

Frequency of alcohol consumption during pregnancy	1	721434.00	-.47	.642

Note. * significant at $p \leq .25$
**significant at $p \leq .05$

Results for the Independent t-test Analyses

Independent t-tests were conducted on all variables that were continuous. The Independent t-test analyses showed that two of the four variables were significant for breastfeeding initiation ($p \leq .25$), and four of the seven variables were significant for exclusive breastfeeding at six months. The results for the Independent t-test analyses are reported in Tables 5 and 6.

T*able 5*

Independent t-test Analyses of Continuous Variables for Breastfeeding Initiation

Variable Name	*Mean +/_ SE*	*Indep. t Test*	*P*
BMI before pregnancy			
Initiated	24.11±.079	3.59	<.001**
No Initiation	25.19±5.73		
Year of Immigration			
Initiated	1994.74±.30	.45	.653
No Initiation	1995.61±1.55		
Weight of baby in pounds			
Initiated	7.22±.016	-.77	.443
No Initiation	7.18±.052		
Number of live births			
Initiated	1.80±.015	5.60	<.001**
No Initiation	2.07±.050		

Note. A dash is used in place where the variable was not analyzed.
* significant at $p \leq .25$
**significant at $p \leq .05$

Table 6

Independent t-test Analyses of Continuous Variables for Exclusive Breastfeeding at Six Months

Variable Name	Mean +/_ SE	Indep. *t* Test	*P*
BMI before pregnancy			
Exclusive	23.39±.18	4.06	<.001**
Not Exclusive	24.22±.09		
Length of stay after delivery			
Exclusive	1.96±.05	6.27	<.001**
Not Exclusive	2.32±.03		
Age of the baby when the mother returned to work			
Exclusive	17.22±.44	.56	.576
Not Exclusive	17.89±1.13		
Year of Immigration			
Exclusive	1994.09±.78	.99	.321
Not Exclusive	1994.80±.35		
Edinburgh Postnatal Depression Scale	4.96±.18	1.59	.113*
Exclusive	5.27±.08		
Not Exclusive			
Weight of baby in pounds			
Exclusive	7.22±.04	-.18	.861
Not Exclusive	7.21±.012		
Number of live births			
Exclusive	1.78±.02	-3.02	.003**
Not Exclusive	1.91±.04		

*significant at $p \leq .25$
**significant at $p \leq .05$

Results for the Breastfeeding Initiation Logistic Regression Analysis

The logistic regression analyses revealed that thirteen of the thirty-one variables were significant for breastfeeding initiation ($p \leq .05$). The Hosmer and Lemshow goodness of fit test was used to assess the fit of the model. The test was non significant (X^2, 5.06; $p = .751$) indicating a good fit (Fields, 2005, p. 254). The overall precision of the model was 92.5%. The results for the logistic regression analyses for breastfeeding initiation are reported in Table 7.

Table 7

Logistic Regression Analysis for Predictors with a Univariate Significance of $p \leq .25$ for Breastfeeding Initiation

Variable	B	SE	OR	CI_{95}	*P*
Prenatal education for primiparous women	.081	.133	1.084	.835-1.408	.545
Adequate information received about breastfeeding.	-1.170	.217	.311	.203-.475	<.001*
Adequate information about formula feeding	.952	.246	2.590	1.598-4.197	<.001*
Planned caesarean	.446	.275	1.562	.912-2.675	.104
Unplanned caesarean	.249	.331	1.283	.671-2.453	.452
Epidural used by women who had/attempted to have a vaginal birth.	.241	.179	1.273	.896-1.808	.178
Pain killing meds used by women who had/attempted to have a vaginal birth	.052	.205	1.053	.704-1.575	.801
Gas breathed through a mask use by women who had/attempted to have a vaginal birth	.000	.229	1.000	.638-1.565	.998
Husband or partner with mother during labour	.058	.315	1.060	.571-1.966	.854
Assistance or an offer of assistance given to initiate breastfeeding from healthcare providers	-1.686	.148	.185	.139-.248	<.001*
Free formula samples given or offered by healthcare providers	1.468	.148	4.341	3.248-5.804	<.001*

First time holding baby, he/she was naked	-.105	.174	.900	.641-1.265	.546
First time holding baby was against the mother's naked skin	-.431	.166	.650	.469-.900	.009*
Location of baby during the first hour after birth					
In mother's bed	REF	REF	REF	REF	REF
In mother's room, but not in bed	-.662	.160	.516	.377-.706	<.001*
In a different room than mother	-.170	.259	.844	.508-1.401	.511
Marital status					
Married	REF	REF	REF	REF	REF
Living common-law	-.094	.178	.910	.643-1.290	.598
Single, widowed, separated or divorced	.507	.317	1.660	.891-3.094	.110
Province in which the baby was born					
Ontario	REF	REF	REF	REF	REF
British Columbia	1.415	.395	4.116	1.898-8.927	<.001*
Alberta	.983	.273	2.672	1.563-4.565	<.001*
Saskatchewan	1.309	.461	3.702	1.500-9.135	.005*
Manitoba	.425	.376	1.529	.731-3.197	.259
Quebec	-.317	.196	.728	.495-1.070	.106
Atlantic Provinces	-.480	.248	.619	.381-1.006	.053
Aboriginal status	.131	.317	1.140	.612-2.123	.679
Mother outside of Canada	1.658	.269	5.248	3.098-8.891	<.001*
Healthcare provider for prenatal care					
OBGYN	REF	REF	REF	REF	REF
GP/Family doctor	-.080	.155	.923	.681-1.251	.605
Midwife, NP, RN, other	.067	.387	1.069	.501-2.281	.863
Smoking during the last three months of pregnancy	.403	.110	1.497	1.207-1.856	<.001*
Mother's perception of labour and delivery	.045	.067	1.046	.917-1.192	.505
Maternal satisfaction with support from husband/partner during labour	.277	.131	1.320	1.021-1.706	.034*
Length of time after delivery until mother first held her baby	.129	.088	1.138	.958-1.352	.142
Length of time baby was in a different room than the mother in the first 24 hours	-.340	.103	.711	.582-.870	.001*
Mother's highest level of education	.089	.038	1.093	1.014-1.178	.020*
Population of the area that the mother lives in	.102	.046	1.107	1.011-1.212	.027*

Total income of all household members in the last 12 months	.029	.037	1.030	.959-1.106	.422
Age of mother at the time of birth	.003	.080	1.003	.857-1.173	.972
Frequency of alcohol consumption during pregnancy	-.015	.009	.985	.968-1.003	.096
BMI before pregnancy	-.002	.013	.998	.973-1.023	.860
Number of live births	-.102	.108	.903	.731-1.117	.348

B - beta, SE – standard error, OR- odds ratio, CI_{95} – 95% confidence interval.
Hosmer and Lemshow goodness of fit test (X^2, 5.059; p = .751).
REF: refers to the reference category
*Significance at $p \leq .05$.
Variables which are significant are italicised.

Results for the Breastfeeding Exclusivity at Six Months Logistic Regression Analysis

The logistic regression analysis revealed that eleven of the thirty-four variables were significant for breastfeeding exclusivity at six months ($p \leq .05$). The Hosmer and Lemshow goodness of fit test was used to assess the fit of the model. The test was non significant (X^2, 11.44; $p = .178$), indicating a good fit (Field, 2005, p. 254). The overall precision of the model was 83.5%. The results for the logistic regression analyses for exclusive breastfeeding at six months are reported in Table 8.

Table 8

Logistic Regression Analysis for Predictors with a Univariate Significance of $p \leq .25$ for Exclusive Breastfeeding at Six Months

Variable	B	SE	OR	CI_{95}	*P*
Prenatal education for primiparous women	-.137	.116	.872	.695-1.093	.235
Adequate information about formula feeding	.522	.122	1.685	1.326-2.141	<.001*
Type of birth (vaginal or caesarean)	.211	.228	1.235	.790-1.931	.355
Unplanned caesarean	-.191	.246	.826	.511-1.338	.438
Epidural used by women who had/attempted to have a vaginal birth.	-.095	.130	.909	.704-1.174	.466
Pain killing meds used by women who had/attempted to have a vaginal birth	.166	.169	1.180	.847-1.645	.328
Husband or partner with mother during labour	.460	.253	1.583	.965-2.598	.069
Assistance or an offer of assistance given to initiate breastfeeding from healthcare providers	-.016	.148	.984	.737-1.314	.914
Free formula samples given or offered by healthcare providers	.260	.135	1.297	.996-1.689	.053
Pacifier used during the first week after birth	.861	.123	2.366	1.859-3.010	<.001*
First time holding baby, he/she was naked	-.198	.129	.820	.637-1.057	.125

First time holding baby was against the mother's naked skin	.038	.121	1.039	.820-1.316	.754
Feeding pattern in the first week					
Fixed Schedule	REF	REF	REF	REF	REF
Demand Feeding	.170	.172	1.186	.847-1.660	.123
Combination of fixed and demand	.275	.179	1.317	.928-1.868	.125
Location of baby during the first hour after birth					
In mother's bed	REF	REF	REF	REF	REF
In mother's room, but not in bed	-.225	.122	.799	.629-1.014	.065
In a different room than mother	-.271	.223	.763	.492-1.182	.226
Contacted by healthcare provider at home to inquire about mother and baby's health	-.629	.254	.533	.324-.876	.013*
Marital status					
Married	REF	REF	REF	REF	REF
Living common-law	-.485	.165	.615	.445-.851	.003*
Single, widowed, separated, divorced	-.648	.307	.523	.287-.956	.035*
Province in which the baby was born					
Ontario	REF	REF	REF	REF	REF
British Columbia	.024	.168	1.024	.737-1.423	.888
Alberta	.103	.173	1.108	.789-1.557	.553
Saskatchewan	.420	.284	1.522	.873-2.655	.139
Manitoba	.291	.277	1.338	.777-2.302	.294
Quebec	-.465	.175	.628	.446-.885	.008*
Atlantic provinces	-.073	.272	.930	.546-1.583	.788
Healthcare provider for prenatal care					
OBGYN	REF	REF	REF	REF	REF
GP/Family doctor	.017	.121	1.017	.803-1.288	.887
Midwife, RNP, RN, other	.090	.210	1.094	.725-1.652	.667
Mother born outside of Canada	-.029	.134	.972	.747-1.264	.832
Mother has returned to work since the birth of the baby	.351	.163	1.420	1.032-1.955	.031*
Smoking during the last three months of pregnancy	.374	.167	1.454	1.048-2.016	.025*
Mother's perception of labour and delivery	.043	.054	1.044	.939-1.161	.425
Length of time after delivery until baby was first put to breast	-.163	.059	.849	.757-.953	.005*
Length of time after delivery until mother first held her baby	-.065	.079	.937	.802-1.095	.413

Length of time baby was in a different room than the mother in the first 24 hours	-.009	.094	.991	.824-1.192	.923
Maternal breast pain in the first 3 months	-.218	.074	.804	.696-.930	.003*
Frequency of support available to mother when needed, since the birth	-.122	.064	.885	.780-1.003	.056
Mother's highest level of education	.040	.030	1.041	.981-1.104	.184
Total income of all household members in the last 12 months	-.003	.026	.997	.948-1.049	.910
Age of mother at the time of birth	.161	.061	1.174	1.041-1.325	.009*
BMI before pregnancy	-.027	.012	.973	.950-.997	.025*
Length of stay after delivery	-.075	.057	.928	.830-1.036	.184
Edinburgh Postnatal Depression Scale	.002	.014	1.002	.976-1.029	.861
Number of live births	.032	.092	1.032	.862-1.236	.728

B - beta, SE – standard error, OR- odds ratio, CI_{95} – 95% confidence interval.
Hosmer and Lemshow goodness of fit test (X^2, 11.442; p = .178).
REF: refers to the reference category.
*Significance at $p \leq .05$.
Significant variables are italicised.

Chapter V

Discussion

Chapter five provides a summary and discussion of findings from this study in relation to the literature on the topics of breastfeeding initiation and exclusivity at six months. Recommendations for practice in the areas of prenatal, intrapartum and postpartum care are discussed as well as areas for future research.

A logistic regression analysis of potential predictors for breastfeeding initiation and exclusivity of breastfeeding at six months revealed a number of independent predictors that have previously been identified in the literature as well as some that have not been addressed. The significant independent predictors of breastfeeding initiation were found to be: adequate information received about breastfeeding, information received about formula feeding, assistance or an offer of assistance given to initiate breastfeeding from healthcare providers, first time holding the baby was against the mother's naked skin, baby in bed with mother for the first hour after birth, baby born in British Columbia, Alberta or Saskatchewan, mother not born in Canada, smoking during the last three months of pregnancy, maternal dissatisfaction with support from her husband during labour, length of time the baby spent in a different room in the first twenty four hours, mother's level of education, population of the area that the mother lives in.

The significant predictors of exclusive breastfeeding at six months were found to be: information received about formula feeding, pacifier used in the first week after birth, contacted by a healthcare provider at home after the birth, marital status, baby born in

Quebec, mother returning to work since the birth of the baby, smoking during the last three months of pregnancy, length of time after delivery until the baby was first put to breast, maternal breast pain in the first three months, age of mother at the time of birth, prepregnancy BMI.

Prenatal Predictors of Breastfeeding Outcomes

The prenatal predictors of breastfeeding initiation were found to be smoking during the last three months of pregnancy, adequate information received about breastfeeding, adequate information about formula feeding. The prenatal predictors of exclusive breastfeeding at six months were found to be prepregnancy BMI and adequate information about formula feeding received. The results are discussed in relation to the literature.

Body mass index.

Prepregnancy BMI, as opposed to another time period, was chosen as a variable for this study because it had been used in relation to breastfeeding outcomes previously in the literature. When entered into the logistic regression model, a mother's prepregnancy body mass index (BMI) was not found to be a predictor of breastfeeding initiation, however it was found to be a negative predictor of exclusive breastfeeding at six months (OR, .97; CI_{95}, .95 to 1.0). The literature contains conflicting support for obesity as a predictor for breastfeeding outcomes. The findings from this study for breastfeeding initiation are consistent with those found by Hilson, Rasmussen & Kjolhede (1997). The authors found there was no statistical difference between the women categorized as obese, versus those who were not, in their choice to initiate breastfeeding. However,

there are two studies cited in the literature (Donath and Amir, 2000; Mok et al., 2008) which have found that women who were obese were less likely to initiate breastfeeding when compared with women who had a normal BMI, which is inconsistent with the findings from this current study. Differences in the findings could be from methodological differences. The study by Donath and Amir only included sociodemographic variables in their model, while Mok et al., only did univariate analyses on the variables in their study.

The literature also includes four studies (Kehler, Chaput & Tough, 2009; Donath & Amir, 2000; Hilson, Rasmussen & Kjolhede, 1997; & Mok et al., 2008) which identified a high prepregnancy BMI with early cessation of breastfeeding. The study by Mok et al. (2008) was the only study found which addressed exclusivity, with findings that women who were obese were less likely to exclusively breastfeed at one and three months. The results of Mok et al. (2008) are similar to those from the present study; however, this study provides a unique contribution to the literature because it is looks at exclusivity at six months, which is the current recommendation for exclusive breastfeeding.

Smoking.

The variable used to assess the impact of smoking on breastfeeding outcomes looked at maternal smoking habits in the three months before birth. The data analysis from this study suggests that women who were more likely not to smoke during the last three months of their pregnancy were more likely to initiate breastfeeding (OR, 1.50; CI_{95}, 1.21 to 1.86), and to exclusively breastfeed at six months (OR, 1.46; CI_{95}, 1.05 to

2.02). These findings of decreased initiation rates are supported by the literature in which three studies (Dennis, 2000; Grossman, Fitzsimmons, Larsen-Alexander, Sachs & Harter, 1990; Hilson, Rasmussen & Kjolhede; 1997) found that smoking during pregnancy was inversely related to making a decision to breastfeed and breastfeeding initiation.

The effects of smoking during pregnancy have also been found in the literature to affect breastfeeding duration and exclusivity. Three studies (Donath & Amir, 2000; Kehler et al., 2009; & Lande et al., 2003) have found that smoking during pregnancy is a significant risk factor for early cessation of breastfeeding. Wijindaele, Lakshman, Landsbaugh, Ong and Ogilvie (2009) also found that smoking was a predictor of early introduction of solids prior to six months. To date there has not been research looking at exclusivity at six months; however, Lande et al. (2003), have addressed exclusivity at four months, finding that mothers who smoked were less likely to exclusively breastfeed at four months.

The findings from this study are in agreement with the limited research available regarding exclusivity at four months and take one step further by suggesting that smoking continues to negatively impact breastfeeding exclusivity at six months.

Alcohol consumption.

The evidence for the impact of maternal smoking on breastfeeding outcomes has been so well documented, the researcher thought it would be prudent to assess whether maternal alcohol consumption also had an impact on breastfeeding outcomes. When entered into the logistic regression model, alcohol consumption was not found to be a predictor of breastfeeding initiation (OR, .99; CI_{95}, .97 to 1.00). Alcohol was not entered

into the regression model for exclusive breastfeeding at six months because it had been non significant in the univariate analysis (U = 721434.00; p = .642). Similarly, one study which looked at a variety of factors which influenced breastfeeding duration at four months found that alcohol was not a significant predictor of breastfeeding duration.

Attendance at child birth classes.

The univariate analysis for this study found that primiparous women who attended child birth classes were more likely to initiate breastfeeding and to exclusively breastfeed; however, when this predictor was placed in the logistic regression it was no longer found to be a predictor of breastfeeding initiation or exclusivity at six months. To date there has only been one study by Grossman et al., (1990) which looked at the impact of prenatal Lamaze classes on breastfeeding initiation and found that the classes were a positive predictor of breastfeeding initiation. The discrepancy between the findings of the two studies could be due to the fact that the logistic regression done by Grossman et al., (1990) only included 3 potential predictors (previous success with breastfeeding, Lamaze instruction and maternal education level), while the current study included many more predictors. It is also difficult to compare when the study by Grossman et al., (1990) focused only on Lamaze classes, while the MES took into account any type of prenatal class that the mother may have attended. Furthermore, prenatal care class curriculums are not standardized and breastfeeding management may not be included in certain prenatal programs.

Healthcare provider for prenatal care.

The variable that was used to assess the type of healthcare provider for prenatal care on breastfeeding outcomes had three groupings: Obstetrician and gynaecologist, family physician or general practitioner and midwife, nurse practitioner, registered nurse, other. Those who fell into the other category were not specified in the MES. When these categories for providers were entered into the logistic regression for breastfeeding initiation and exclusive breastfeeding at six months they were not found to be significant. This variable was unique to this study and research in this area was not found when a literature review was conducted. While there are multiple studies assessing the impact of midwifery interventions on breastfeeding outcomes, a study could not be found that compared different prenatal care providers to one another on breastfeeding outcomes.

Depression.

The Edinburgh Postnatal Depression Scale (EPDS) is the depression screening tool used on the MES. An analysis of the EPDS was not done for breastfeeding initiation because the EPDS is meant to detect depression in the postpartum period, which is beyond the immediate postnatal time of breastfeeding initiation. When entered into the regression model, the EPDS was not found to be significant for breastfeeding exclusivity at six months (OR, 1.00; CI_{95}, 9.76 to 1.03). When comparing these results to the literature, one Canadian study was found which also used the EPDS to assess the predictors of early cessation prior to six months (Kehler, Chaput & Tough, 2009). In their univariate analyses, women who were classified using the EPDS as being depressed were more likely to discontinue breastfeeding prior to six months; however, similarly to

this study's findings, depression was not found to be a predictor when entered into the multivariate logistic regression. Falceto, Giugliania and Fernandes (2004) similarly found that a diagnosis of mental health disorder was not statistically significant for duration of breastfeeding.

In contrast to the current study and the two studies mentioned previously, one study by Pugh and Milligan (1998) reported that depression in the postpartum period led to earlier cessation of breastfeeding. The difference between findings could be found in the small sample size (n =60) and the timing of the screening for depression, which was at fourteen days postpartum in the Pugh and Milligan study. The MES survey was conducted much later in the postpartum period. It is possible that because the questions were asked late in the postpartum period that women had moved past any depressive symptoms they may have experienced in the early postpartum period and could have impacted breastfeeding exclusivity earlier on.

Mother's stress in the previous twelve months.

An additional question in the MES looked at maternal mental health by asking mothers about their perceived level of stress in the twelve months leading up to the birth of their baby. When analyzed for univariate significance, the variable was non significant for both breastfeeding initiation (U = 630088.00; p = .765) and exclusive breastfeeding at six months (U = 719049.00; p = .676). After conducting a literature review it appears that this variable is unique to this study.

Adequate feeding information.

The MES assessed each mother's perception of the adequacy of breastfeeding information that she received. The data analysis for this variable suggests that the more likely a woman was to say she had not received enough information about how to breastfeed her baby, the more likely she was to not initiate breastfeeding (OR, .31; CI $_{95,}$ .20 to .487). This variable was not significant in the univariate analysis for exclusive breastfeeding at six months and was therefore not included in the logistic regression for this time period. One similar study was found in the literature review which assessed the adequacy of breastfeeding information that a mother had received (Blythe et al., 2004). According to the study, mothers who perceived that they had received adequate breastfeeding information were more likely to still be breastfeeding at one week, compared to those who did not. However, when entered into a logistic regression, adequate breastfeeding information was not found to be a predictor of breastfeeding at four months. Interpretation of these two studies would suggest that a woman's perception of having received adequate information about breastfeeding increased breastfeeding initiation and duration over the short term, but did not affect breastfeeding outcomes over the long term.

The MES also addressed the adequacy of formula feeding information that the mother received and was included in this analysis. The data for this variable suggests that the more likely the woman was to not receive adequate formula feeding information, the more likely she was to initiate breastfeeding (OR, 2.59; CI_{95}, 1.60 to 4.20) and still be exclusively breastfeeding at six months (OR, 1.69; CI_{95}, 1.33 to 2.14).

A recent Ontario study (Sheehan et al., 2006) looked at a similar variable regarding the provision of formula feeding information in the hospital. In their study they assessed the mother's desire to receive information about formula feeding and found that those women who desired to have more information about bottle feeding were more likely to discontinue breastfeeding by four weeks postpartum. It is difficult to know however, whether these women did receive the formula feeding information that they had desired to have, and whether it was the information that decreased their breastfeeding, or whether they desired the information because they had already made a decision to decrease their breastfeeding.

Intrapartum Predictors of Breastfeeding Outcomes

The intrapartum predictor of breastfeeding initiation was found to be maternal satisfaction with support from husband/partner during labour. The results are discussed in relation to the literature.

Mode of delivery.

The impact of a woman's mode of delivery was analyzed and it was found that there was no difference between a vaginal birth or c-section on either initiation (X^2, p = .394) nor exclusivity at six months (OR, 1.24; CI_{95}, 7.90 to 1.93). These results coincide with two studies found in a review by Dennis (2002), which found no association between the mode of delivery and a woman's breastfeeding choices. However, in the same review there were four studies which found that a caesarean section reduced initiation, but did not have an impact on the duration of breastfeeding.

Due to the evidence found in the review by Dennis (2002), this study investigated further into other mode of delivery variables, including if the woman had a planned or unplanned c-section and the mother's perception of her labour and delivery experience. The results for the type of c-section suggest that neither a planned c-section (BFI - OR, 1.56; CI_{95}, .91 to 2.68; EBF - X^2 (1, N = 3506) = .15; p = .695) nor an unplanned c-section (BFI – OR, 1.28; CI_{95}, .67 to 2.45; EBF – OR .83, CI_{95}, .51 to 1.34) had any impact on initiation or exclusivity of breastfeeding. When tested, a mother's perception of her labour and delivery experience was also found to be non significant for both breastfeeding initiation (OR, 1.05; CI_{95}, .92 to 1.19) and exclusivity at six months (OR, 1.04; CI_{95}, .94 to 1.16). These results could be viewed in a positive light implying that even if a woman had a poor perception of her birth it did not affect her breastfeeding choices.

Use of labour analgesia.

The MES measured three different types of analgesia often used for the birthing process including epidurals, pain killing medications such as Demerol, morphine or fentanyl and gas breathed through a mask. Each type of labour analgesia was found to be non significant for both breastfeeding initiation and exclusivity at six months. These results are similar to the two studies reviewed by Dennis (2002), in which it was found that even though the use of labour analgesia diminished sucking initially, there was no significant impact on breastfeeding outcomes.

Labour support.

Labour support can be provided by a husband, partner or companion such as a trained doula or simply a friend. The MES measured the presence and maternal satisfaction with support for both husbands/partners and a companion at the birth. The univariate analyses for having a companion present during the birth suggested that there is no impact on breastfeeding initiation (X^2 (1, N = 4412) = .12; p = .732) or exclusive breastfeeding at six months (X^2 (1, N = 3504) = 1.15; p = .284). These variables were therefore not included in the logistic regression model. The mother's level of satisfaction with the companion was also non significant in the univariate analysis for both initiation (U, 627148.500; p = .735) and exclusivity at six months (U, 707161.000; p =.277).

Conflicting evidence for the impact of a companion during labour on breastfeeding outcomes has been found in a review by Dennis (2002). Within the review, one study was found in which there was no effect on breastfeeding outcomes when a doula had been present, yet two other studies found a positive correlation to breastfeeding exclusivity at four and six weeks postpartum. It is difficult to compare the studies found in the literature review by Dennis and the results of this study because the MES did not specify between having a trained labour doula and having a friend as a support person for the labour. As part of their care, trained labour doulas often assist a mother with latching the baby initially in the hospital and provide follow-up support for breastfeeding in the post-partum period, something that many lay companions may not be able to assist with. It is also difficult to compare the results due to the differences in exclusive breastfeeding time frames (4 to 6 weeks compared to 6 months).

When assessing the impact of a husband or partner's presence for the labour, similar results were found. The results of this study also suggest that having a husband or partner present during the labour does not affect initiation (OR, 1.06; CI_{95}, .57 to 1.97) or exclusivity at six months (OR, 1.58; CI_{95}, .97 to 2.60).

To investigate further the impact of labour support on breastfeeding outcomes, the maternal satisfaction with the husband or partner's level of support during the labour and birth was analyzed. The results were surprising and suggest that the more likely a woman was to be dissatisfied with her husband or partner's support the more likely she was to initiate breastfeeding (OR, 1.32; CI_{95}, 1.02 to 1.71). The analysis for exclusive breastfeeding at six months was non significant in the univariate analysis and was not included in the regression model.

It is difficult to explain why a mother's increasing dissatisfaction with her husband or partner's support during the labour process would positively influence her breastfeeding initiation. It is plausible to suggest that in a relationship which is troubled, the mother may try to have a stronger connection with her baby to offset the negative emotions she has with her husband or partner. Further research into this interesting result would be beneficial.

Postpartum Predictors of Breastfeeding Outcomes

The postpartum predictors of breastfeeding initiation were found to be: assistance or offer of assistance given to initiate breastfeeding from healthcare providers, free formula samples given or offered by healthcare providers, length of time the baby was in a different room that the mother in the first twenty-four hours, location of the baby in the

first hour after birth and the first time the baby was held was against the mother's naked skin. The postpartum predictors of exclusive breastfeeding at six months were found to be: adequate information about formula feeding, length of time after delivery until baby was first put to breast, pacifier used during the first week after birth, contacted by healthcare provider at home to inquire about mother and baby's health, and maternal breast pain in the first three months. The results are discussed below in relation to the literature.

Baby friendly hospital initiatives.

The Baby Friendly Hospital Initiative (BFHI) is a program developed by the World Health Organization (WHO) and by UNICEF to promote breastfeeding in hospitals. The MES contained numerous questions which focused on seven of the ten steps in the BFHI. Step three is for health care professionals to educate mothers about the benefits of breastfeeding and to teach them how to breastfeed. The MES addressed this step by asking mothers if they had been assisted or offered assistance to initiate breastfeeding from a healthcare provider. This variable was found to be an independent predictor of breastfeeding initiation with the results showing that the more likely a mother did not receive assistance, the more likely she would not initiate breastfeeding (OR, .19; CI_{95}, .14 to .25). However, it was not found to be a predictor of breastfeeding exclusivity at six months (OR, .98; CI_{95}, .74 to 1.31).

Step four of the BFHI is to help mothers initiate breastfeeding in the first half of an hour postpartum. The MES addressed this step by asking mothers the timing of their first breastfeeding. The results of the analysis suggest that the longer it took to initiate

the first feeding, the less likely the mother was to be exclusively breastfeeding at six months (OR, .85; CI_{95}, 7.57 to .95). To date there has been conflicting research in the literature about the timing of the first feed. In a review by Dennis (2002), the review found two studies that showed early initiation of breastfeeding increased duration; however, a small meta-analysis and a systematic review of ten studies showed no critical period for breastfeeding initiation. None of these studies specifically assessed breastfeeding exclusivity at six months, and this could be a reason for the difference in outcomes.

The MES also asked a question similar to the timing of the first feed, which was the timing of holding the baby for the first time. Studies examining this variable were not found in the literature review and it may be unique to this study. The timing of the mother first holding her baby was not found to be a predictor of breastfeeding initiation (OR, 1.14; CI_{95}, .96 to 1.35) or exclusivity at six months (OR, .94; CI_{95}, .80 to 1.10).

Step six in the BFHI is to only feed newborns breast milk unless medically indicated. It the MES did not specifically address this step by asking mothers if they had fed formula, or other liquids or solids, on the basis of a recommendation from a health care profession; however, it did ask mothers if a health care professional had given or offered free formula samples. This variable was found to be an independent predictor for breastfeeding initiation (OR, 4.34; CI_{95}, 3.25 to 5.80) and was close to significance for exclusive breastfeeding at six months ($p = .053$). The literature review did not reveal any studies examining this variable in relation to exclusive breastfeeding at six months;

however, a recent Ontario study by Sheehan et. al. (2006) found that supplementation in a hospital decreased breastfeeding at four weeks postpartum.

One limitation with this variable is that it is difficult to assess the timing of when the health care professional offered the formula. Many times it is offered after a delivery, particularly a caesarean delivery, because the mother is tired or not feeling well, and the health care professional is offering it as an alternative for feeding until the mother is up to breastfeeding. However, it can be that free formula samples are given to mothers who have already started feeding formula and made a decision to never attempt to initiate breastfeeding. There has been debate in the health care setting on whether it is appropriate to remove formula from hospitals and insist that parents bring their own. An investigation into the effect of a formula-free hospital versus a hospital which stocks formula on breastfeeding outcomes would be beneficial to help determine any potential confounding variables.

The seventh step in the BFHI is for the mothers and babies to room-in together. The meaning of this is for mothers and babies to remain together twenty-four hours a day. The MES asked mothers about the length of time that the baby spent in a different room in the first twenty-four hours. The results suggest that as the baby spends an increasing amount of time away from the mother's room, the mother is less likely to initiate breastfeeding (OR, .71; CI_{95}, .96 to 1.35). This variable was not significant for exclusive breastfeeding at six months.

The MES also asked a more specific question about the location of the baby in the first hour after birth, either in bed with the mother, in the same room as the mother but

not in her bed, or in a different room. This variable applies to step seven of the BFHI because it addresses a common situation in which the baby is removed from the room in the first hour for assessments weights or other routine procedures. The data analyses suggest that when a baby was in the mother's room, but not in her bed, she was less likely to initiate breastfeeding when compared to a mother who had her baby in her bed with her for the first hour (OR, .53; CI_{95}, .38 to .71). Having the baby in a different room for the first hour compared to in the mother's bed did not have an impact on breastfeeding initiation (OR, .84; CI_{95}, .51 to 1.40). The location of the baby in the first hour following birth was not found to be significant for exclusive breastfeeding at six months in the logistic regression. While the results of the current study suggest that rooming-in does not have a significant impact over the long term for breastfeeding exclusivity, there have been studies (Dennis, 2002; Falceto et al., 2004) which have shown that it does have a positive impact on partial breastfeeding duration.

Step eight in the BFHI is for health care professionals to encourage breastfeeding on demand. The MES asked mothers what type of feeding pattern they used during the first week: a fixed schedule, demand feeding or a combination of fixed and demand feeding. The variable was assessed for breastfeeding exclusivity at six months and not found to be a significant predictor. Similarly, Murray et al. (2007) investigated baby friendly hospital practices and found that encouraging mothers to feed on demand was not an independent predictor of breastfeeding at four months of age.

The ninth step of the BFHI is to avoid giving pacifiers to breastfeeding infants. The MES asked mothers if their baby had used a pacifier during the first week of life.

This variable was assessed and it was found that babies who did not receive a soother in the first week of life were more likely to be exclusively breastfed at six months (OR, 2.37; CI_{95}, 1.86 to 3.01). These results are similar to those found in a study by Murray et al. (2007) in which babies who had not used a pacifier while in the hospital were more likely to be breastfeeding at four months of age.

While pacifier usage generally starts while in the hospital, it may not necessarily be given by a health care professional. Often parents bring their own pacifiers to the hospital and give them to their own infant. Also, the question asked in the MES looks at the first week of life, which extends beyond the time a mother and baby dyad spend in the hospital after delivery. It could be that babies are being given a soother when they get home. For the purpose of interpretation of these results it cannot be said that pacifier usage is being initiated by health care professionals.

Step ten of the BFHI is to enable breastfeeding support groups and to provide mothers with information about breastfeeding support groups upon discharge from the hospital or clinic. The MES specifically asks mothers if they were offered community breastfeeding resources. This variable was not assessed for breastfeeding initiation resources for breastfeeding support are given after a mother has made the decision to initiate breastfeeding. When assessed for its impact on breastfeeding exclusivity at six months it was not significant in the univariate analysis (X^2 (1, N = 3491) = .20; p = .656) and was therefore not entered into the logistic regression model. These findings are in contrast to those of Murray et al. (2007), in which it was found that providing the mother with a phone number of a breastfeeding resource improved breastfeeding outcomes at

four months postpartum. The differences in results could be from methodological differences in studies, where Murray analyzed hospital practices using univariate analyses, compared to this study in which multivariate logistic regression was used.

Skin to skin contact between mother and baby is another hospital practice which has been found to affect breastfeeding outcomes; however, it is not considered in the ten steps of the BFHI. The MES addressed this practice through two questions. The first is whether the baby was placed on the mother naked, and the second is whether the mother's chest was naked when the baby was placed there. The results of the analysis suggest that having the baby's skin naked when held by the mother for the first time is not a predictor of breastfeeding initiation (OR, .90 CI_{95}, .64 to 1.27) or exclusivity at six months (OR, .82; CI_{95}, .64 to 1.06) . However, the results did suggest that the more likely a mother's chest was not naked, the less likely the mother was to initiate breastfeeding (OR, .65; CI_{95}, .47 to .90). This was not found to affect exclusive breastfeeding at six months (OR, 1.04; CI_{95}, .82 to 1.32). It is difficult to compare these results with those from the literature due to the fact that the mother's skin and baby's skin contact are separated variables, and does not necessarily reflect that both mother and baby's skin were touching. Similar research however has demonstrated that skin to skin contact does increase breastfeeding initiation (Moore, Anderson & Bergman, 2007) and increase the exclusivity of breastfeeding while in the hospital (Bramson et al., 2009).

Length of stay.

Over the past several decades the length of stay for women who birthed vaginally and by caesarean section has decreased in hospitals and clinics. This variable was assessed for the outcome of exclusive breastfeeding at six months and was found to be non significant (OR, .93; CI_{95}, .83 to 1.04). These results are consistent with the Ontario study done by Sheehan et al. (2006) in which women who were offered a 60 hour length of stay (post vaginal birth) and accepted, did not have a statistically significant increase in exclusive breastfeeding at four weeks postpartum. A study could not be found which looked at length of stay and exclusivity of breastfeeding at six months.

Infant health.

The variable chosen from the MES to represent infant health asked mothers if the baby had needed to see a doctor or other healthcare provider for a problem or illness other than a routine check-up. When this potential predictor was analysed it was not found to be significant for exclusive breastfeeding at six months in the univariate analyses (X^2 (1, N = 3506) = 1.07; p = .300). It is important to note that infants who were admitted immediately post birth to a NICU or special care nursery were excluded from the analyses. It is possible that if they were included that there would have been a difference in statistical outcomes. There have been two studies found in the literature which suggest that infant health issues increased early weaning (Millar & Maclean, 2005; Sheehan et al., 2006). In the article by Millar and Maclean (2005), there is no mention of controlling for admission to a NICU, however in the Sheehan et al. study, infant health was measured by readmissions to the hospital after initial discharge. It is difficult to

compare these studies with the current findings of this study as the measurements of infant health are different. This could account for the differences in the results of finding infant health non significant for exclusive breastfeeding at six months.

Maternal health.

Overall maternal health was assessed by the MES through a question which asked mothers if they had been required to see a physician or other healthcare provider other than a routine visit since the birth of the baby. An additional question which was more specific to breastfeeding related health was also asked, in which mothers were asked how much of a problem had breast pain been in the first three months after the birth of the baby. The variable which addressed overall health was only assessed for exclusive breastfeeding at six months due to the reason that the question asked of mothers only looked at the postpartum experience of maternal health. This variable was found to be non significant for exclusive breastfeeding at six months in the univariate analysis (X^2 (1, N = 3504) = .05; p = .833), and was not included in the logistic regression. In a univariate analysis, Sheehan et al., (2006) found that mothers who had visited a walk-in clinic for their personal health were more likely to discontinue breastfeeding by four weeks. The differences in findings may be from the difference in the time frame of measuring breastfeeding as well as comparing complete cessation of breastfeeding versus cessation of exclusivity.

The variable which measured more specifically breast health was found to be a negative predictor of exclusive breastfeeding at six months (OR, .80; CI_{95}, .70 to .93). At the time of this study, there was no other similar study which looked at breast pain as a

possible predictor of breastfeeding outcomes, and more specifically exclusive breastfeeding at six months.

Professional support within the community.

The variable used to assess professional support within the community was measured on the MES through a question which asked mothers if they were contacted at home by a healthcare provider, such as a public health nurse or midwife to see how the mother and baby were doing. This variable was not assessed for an impact on breastfeeding initiation because it occurs later in the postpartum period, after the decision to breastfeed would be made. The results of the data analyses suggest that this variable is a predictor of breastfeeding exclusivity at six months. More specifically, those women who were not contacted by a health care professional at home were more likely to not exclusively breastfeed until six months (OR, .53; CI_{95}, .32 to .88). These results contrast with a Cochrane database systematic review by Britton et al. (2007) and an Ontario study by Sheehan et al. (2006) in which both report that a single phone call for support was not effective in increasing duration of breastfeeding. Both studies suggest that repeated face-to-face interventions would be more beneficial in increasing the duration of breastfeeding. It is difficult to compare the findings from these studies with those in this study because the question on the MES is not specific about the type of contact made by the health care professional or the number of times that contact was made. However, the primary contact can serve as a connection with a health care professional who may be able to follow-up with mothers in their home who are having difficulties. As women are being discharged early from hospitals, issues with breastfeeding are arising when they are

at home. With further and more specific research this important intervention could prove to be successful in increasing the exclusivity of breastfeeding at six months.

Social support.

Social support was measured in this study by a question which asked mothers how often support was available when they felt they needed it, since the birth of their baby. This variable was found to be close to significance ($p \leq .05$) for exclusive breastfeeding at six months (OR, .89; CI_{95}, .78 to 1.00; $p = .056$). These findings of insignificance are contrasted with one literature review (Dennis, 2002), one qualitative study (Locklin et al., 1995) and two independent studies which all found that when a mother used or received breastfeeding support from a social support system the duration of breastfeeding was longer. The differences in findings could be in part because the question on the MES did not specifically address breastfeeding support, while the other studies mentioned looked at this type of support for mothers. In addition, none of the studies measured the breastfeeding duration in terms of exclusivity at six months.

Socio-Demographic Predictors of Breastfeeding Outcomes

The Socio-demographic predictors of breastfeeding initiation were found to be a mother born outside of Canada, mother's highest level of education, province in which the baby was born, and the population of the area that the mother lives in. The predictors for exclusive breastfeeding at six months were found to be marital status, mother's returned to work since the birth of the baby, province of birth, and age of the mother at the time of the birth. The findings are discussed below in relation to the literature.

Birth weight.

There have been three studies in the literature (Grossman et al., 1990; Liubai et al., 2003 & Lande et al., 2003) which have shown that a higher birth weight leads to better breastfeeding outcomes including exclusivity at six months. The data analyses from this study suggest the opposite is true, in that birth weight as a predictor for breastfeeding outcomes, was found to be non significant in the univariate analyses for both breastfeeding initiation (*t*, -.768; $p = .443$) and exclusivity at six months (*t*, -.175; $p = .861$). One reason for the differences found between the literature and this current study could be that this study excluded all infants who were admitted to a NICU or special care nursery. These infants are often small for gestational age or large for gestational age. By excluding these babies, most of the infants that would have been included in this study would have had weights that were appropriate for gestation. The studies mentioned previously did not have exclusion criteria based on weight or admission to a NICU and therefore could have been including small for gestation infants or large for gestation infants. Often these infants are more difficult to feed and that could impact breastfeeding outcomes.

Maternal immigration.

Maternal immigration was measured using two variables. One variable looked at whether the mother was born in Canada or abroad, and the second variable looked at the length of time the mother had lived in Canada. When the first variable for location of maternal birth was analyzed, the results showed that those women who were not born in Canada were more likely to initiate breastfeeding (OR, 5.25; CI_{95}, 3.10 to 8.89). This

variable was not found to be a predictor of exclusivity at six months (OR, .97; CI_{95}, .75 to 1.26). The result of an increase in initiation for immigrant woman was also found to be true in a Canadian study which analyzed the 2003 Canadian Community Health Survey (Millar & Maclean, 2005). The non significant results for the duration of breastfeeding contrast with the results of the Ontario Mother and Infant Survey II (Sheehan et al., 2006), in which early cessation was lower for those women born outside of Canada. However, the Sheehan et al. study and the current study utilized different time frames to measure duration of breastfeeding. The Ontario Mother Infant Survey II looked at duration over four weeks, while this study is looking at exclusivity over six months.

To assess the impact of maternal immigration further, the length of time a mother has lived in Canada was included in the analyses. This variable was found to be non significant for both breastfeeding initiation (t, .449; p = .653) and exclusivity at six months (t, .992; p = .321). These findings are different than those found in the literature review by Dennis (2002), in which three studies had found that women who had more recently immigrated to the United States were more likely to initiate breastfeeding. Duration was not assessed.

Maternal education.

Maternal education level has consistently been shown to impact breastfeeding initiation rates (Grossman et al., 1990; Hilson et al., 1997; Millar & Maclean, 2005). The results from this study are in agreement with those found in the literature in that those women who have a higher education, are more likely to initiate breastfeeding (OR, 1.09;

CI_{95}, 1.01 to 1.18). The findings for exclusive breastfeeding at six months however were not found to be significant (OR, 1.04; CI_{95}, .98 to 1.10).

These non significant findings for exclusive breastfeeding at six months contrast the results of an analysis of the 2003 Canadian Community Health Survey (Millar & Maclean, 2005) in which women who had a postsecondary degree were more likely to exclusively breastfeed at six months. The differences in the findings could come from the fact that the logistic regression model created by Millar and Maclean only included socio-demographic variables, whereas the model in this study has an array of antepartum variables in addition to demographic variables.

Income.

Similarly to the maternal education variable, higher household income has consistently been shown in the literature to increase breastfeeding initiation (Dennis, 2002; Grossman et al., 1990; Millar & Maclean, 2005) and duration (Dennis, 2002 & Donath & Amir, 2000). The results from this present study are in contrast with those found previously in the literature. The data analysis for breast feeding initiation was non significant (OR, 1.03; CI_{95}, .96 to 1.11) and the same was true for breastfeeding exclusivity at six months (OR, .997; CI_{95}, .95 to 1.05). The differences found in this study's results and those found in the literature could be due methodological differences the same as was found in the maternal education variable. Again it is true that the Canadian study done by Millar and Maclean only included socio-demographic variables, whereas this study also included numerous additional antepartum variables in the logistic regression for both initiation and exclusivity at six months. It is plausible that the

addition of these variables decrease the effect of income on women's breastfeeding choices.

Marital status.

The variable that was used to assess the impact of marital status on breastfeeding outcomes was composed of three categories: married, living common-law and a combined group of those women who were single, divorced, widowed or separated. The findings from the data analysis suggest that marital status does not have an impact on breastfeeding initiation when entered into the logistic regression model. However, when entered into the model for exclusive breastfeeding at six months marital status was found to be significant. When compared with the reference group of women who were married, the results indicate that women who are living common-law and women who are in the combined group of being single, widowed, divorced or separated are less likely to breastfeed exclusively until six months (OR, .62; CI_{95}, .45 to .85 and OR, .52; CI_{95}, .29 to .96 respectively). The literature pertaining to exclusivity supports these findings. One study (Wijndaele et al., 2009) found that being single, compared to married, reduces the early introduction of foods prior to six months. An additional study (Lande et al., 2003) which compared married and living common-law also found that being married increased exclusivity of breastfeeding at four months.

The literature contrasts the findings of this MES study when looking at breastfeeding initiation. Two studies (Grossman et al., 1990; & Millar & Maclean, 2005) were found which showed that being married, when compared with being single, increased breastfeeding initiation rates. A potential reason for the difference in findings

between the current study and those found in the literature could be from the differences used to categorize the relationships of the respondents. Furthermore, the landscape of families is changing, with an ever increasing acceptance of women having children while not being married. This may be reducing the influence of not being married on breastfeeding initiation.

Employment and maternity leave.

A qualitative study done by Stewart-Knox, Gardiner and Wright (2003) illustrated women's perceptions of the practical barriers to breastfeeding, by identifying that returning to work would make breastfeeding too difficult. These results from a qualitative study are supported by this study in which it was shown that a mother who does not return to work is more likely to exclusively breastfeed until six months (OR, 1.42; CI_{95}, 1.03 to 1.96). Two recent quantitative Canadian studies (Baker & Milligan, 2008; & Kehler et al., 2009) have also found that returning to work within the first year of the infant's life reduced exclusive breastfeeding at six months and partial breastfeeding respectively. Kehler et al. suggest that the monetary supplement for the one year maternity leave in Canada is not enough for women who have a lower income or a larger family (p 378).

To further investigate the effect of returning to work, this study included a variable that measured the age of the child when the mother returned to work. The age of the child did not appear to impact breastfeeding exclusivity at six months, as it was non significant in the univariate analysis (*t*, .559; $p = .576$).

Location and Urbanization.

Both the province and the size of the city in which the baby was born have been found to impact breastfeeding outcomes in previous research. When looking at breastfeeding initiation, the data from this study showed that women who gave birth in British Columbia (OR, 4.12; CI_{95}, 1.90 to 8.96), Alberta (OR, 2.67; CI_{95}, 1.56 to 4.57) or Saskatchewan (OR, 3.70; CI_{95}, 1.50 to 9.14) were more likely to initiate breastfeeding when compared to those women who gave birth in Ontario. When looking at exclusive breastfeeding at six months, women who delivered in Quebec were less likely to exclusively breastfeed than those women who delivered in Ontario (OR, .63; CI_{95}, .45 to .89). These results are similar to the Canadian analysis done by Millar and Maclean, (2005) in which women who gave birth in Quebec, Newfoundland, Nova Scotia and New Brunswick were less likely to initiate breastfeeding. Women who gave birth in Quebec and New Brunswick were also less likely to exclusively breastfeed at six months. In contrast, women who gave birth in Alberta or British Columbia were more likely to exclusively breastfeed at six months. Results from the Millar and Maclean (2005) and the current study suggest that breastfeeding outcomes are consistently poorer in Quebec and better in both Alberta and British Columbia. It is important to note that in this analysis of the MES, the Atlantic provinces were grouped together to avoid small cells sizes, and therefore differences between these provinces could not be assessed.

In addition to the birthing location within Canada, the size of the city or town has also been found to be a predictor of breastfeeding outcomes. The data from this study suggest that as the size of the town or city increased, breastfeeding initiation also

increased (OR, 1.11; CI_{95}, 1.01 to 1.21). This variable was not found to be a predictor for breastfeeding exclusivity at six months as it was non significant in the univariate analysis (U, 655260.00; $p = .344$). A study from Canada (Millar & Maclean, 2005) and Norway (Lande et al., 2007), have both shown that women who live in more urban settings are more likely to exclusively breastfeed at six months. The Canadian study also showed an increase in breastfeeding initiation. The differences found for the outcome variable of breastfeeding exclusivity could be from a difference in the categories used to quantify the populations.

Age of mother.

The previous literature has clearly indicated that increasing maternal age increases breastfeeding initiation and duration (Blythe et al., 2004; Dennis, 2002; Donath, & Amir, 2000; Grossman et al., 1990; Hilson et al., 1997; Kehler et al., 2009; Lande et al., 2003; Millar & Maclean, 2005; Wijndaele et al., 2009). The findings from this study do not coincide with those found in the literature for breastfeeding initiation. The data analysis suggests that maternal age at the time of the birth does not significantly impact breastfeeding initiation (OR, 1.00; CI_{95}, .86 to 1.17). The data analysis for exclusive breastfeeding at six months, however, did suggest that increasing maternal age did increase exclusive breastfeeding at six months (OR, 1.17; CI_{95} 1.04 to 1.33). Increasing maternal age was also found to be an independent predictor of breastfeeding exclusivity in the analysis of the 2003 Canadian Community Health Survey (Millar & Maclean, 2005). The difference in results for breastfeeding initiation between the previous literature and the current study could be from the differences in variables that were

included in the logistic regression models for each study. Many studies to date often only include demographic variables and overlook other potential predictors.

Number of live births.

The number of children that a mother has had was measured through a variable that asked mothers how many live births they had had. The purpose of using this variable was to determine if having an increasing number of children increased or decreased breastfeeding outcomes. While the number of live births was significant (at $p \leq .05$) in the univariate analysis for both breastfeeding initiation (t, 5.600; $p < .001$) and exclusivity at six months (t, -3.020; $p = .003$), it was not significant in the logistic regression model for initiation of breastfeeding (OR, .90; CI_{95}, .73 to 1.12) or exclusive breastfeeding at six months (OR, 1.03; CI_{95}, .86 to 1.24). In an initial analysis of the MES by Chalmers et al. (2009), women who were mothers for the first time were more likely to initiate breastfeeding; however, multiparas breastfed for a longer duration and had a higher incidence of exclusivity. The analyses done in this published article, however, were univariate analyses, as a multivariate study of the variables had not been completed at the time. A Brazilian and a Norwegian study both found that babies who are first born are less likely to be breastfed at four and six months. An Australian study was more specific in their analysis and looked at previous breastfeeding experience and found that women who had breastfed a previous child were 2.27 times more likely to be breastfeeding at four months, compared to those who did not have the experience.

There is difficulty in interpreting a variable that looks at the number of live births. In most of the studies mentioned, and with this current study, it has not been determined

if it is previous experience with breastfeeding that increases breastfeeding outcomes for subsequent children or whether it is simply the number of children that a mother has had. The MES did not ask if mothers had experience with breastfeeding previous children, so this could not be assessed.

Aboriginal.

While this study was unable to assess whether ethnicity was a factor in breastfeeding outcomes due to issues with small cell sizes, the MES did specifically ask a question about the aboriginal status of respondents. This variable did not have any concerns with low cell counts and was therefore entered into the study. When entered into the logistic regression model for breastfeeding initiation, this variable was found to be non significant (OR, 1.14; CI_{95}, .61 to 2.12). The variable was also assessed for its impact on breastfeeding exclusivity at six months and was found to be non significant in the univariate analysis (X^2 (1, N = 3506) = .888; p = .346). The accuracy of these findings should be interpreted with caution, however, because aboriginals who lived on reserves were not included in the sampling for the MES due to operational reasons. At this time, there are no research studies found in the literature which assess Canadian aboriginal status and breastfeeding outcomes. Future studies which address this potential predictor should include a comprehensive cross section of aboriginal groups in Canada, including those who live on reserves.

Implications for Nursing Practice

The implications for nursing practice have been divided between prenatal practice strategies and postpartum practice strategies. This was done because often a nurse's

practice focuses on one of these time periods, and separating the two will help nurses pick out which strategies would best suit their practice. It should be noted however, that some of these recommendations can cross from prenatal practice into postpartum practice.

Implications for nursing practice in the prenatal period.

Obesity has become an epidemic in our society. Numerous deleterious effects of obesity have been shown to exist, and now decreased breastfeeding exclusivity at six months is added to the list. Nurses in the Canadian health care system must continue to develop interventions that will help the Canadian population battle this epidemic. Once a mother has had her baby, nurses who support and manage breastfeeding cannot change the woman's prepregnancy BMI, but what they can do is recognize that these women are at high risk of early cessation of exclusive breastfeeding and target them with interventions that can support them to breastfeed for longer. The study by Mok et al. (2008) has identified potential reasons for early cessation of exclusive breastfeeding and could be a starting point for developing interventions for these women.

Similar to obesity, smoking has numerous dangerous effects on health as well. The addition of decreased breastfeeding initiation and exclusivity at six months must now also be taken into consideration. Nurses and other health care professionals who are in contact with pregnant women should screen for smoking behaviours and target interventions towards smoking cessation. In addition to this, nurses can focus on increasing breastfeeding initiation and exclusivity by providing information about the

benefits of breastfeeding despite nicotine being present in breast milk and any other concerns that may arise from their smoking behaviour.

Nurses are often in contact with women in the prenatal period through various prenatal education programs. An interesting finding from this study was that prenatal classes for first time mothers were not found to have an impact on breastfeeding outcomes. However, this study did identify that when mothers perceived they had received adequate breastfeeding information they were more likely to initiate breastfeeding. With this information in hand, nurses who teach prenatal courses should spend more time on integrating breastfeeding management education into their prenatal courses. Often prenatal courses only focus on infant nutrition briefly and spend most of their time on labour management. After determining that the type of birth and the maternal satisfaction with the birth does not have an impact on breastfeeding initiation, it would be safe to decrease the amount of time spent on this issue and increase the time spent on breastfeeding management.

Another interesting finding from this study was that women who did not receive adequate formula feeding information were more likely to initiate and to exclusively breastfeed until six months. In addition to improving breastfeeding management information in prenatal care classes, nurses could retool their curriculums away from infant nutrition, by focusing on breastfeeding information only, and avoiding formula feeding information unless asked. It may be assumed by mothers that if nurses are providing formula feeding information that it is just as good as breastfeeding. The decision is ultimately up to the mother, and if a mother is requesting information on

formula feeding nurses should provide the basic information necessary to ensure babies are safely fed with formula. However, nurses should identify that women asking for this information are at high risk for not breastfeeding and should investigate their reasons for looking into formula feeding options. This would provide the perfect opportunity for further education and clarification about any breastfeeding myths that mothers may have learned about.

Implications for practice in the postpartum period.

Nurses who practice in the immediate postpartum period are involved in the care of mothers at a critical point in time when breastfeeding outcomes are most often impacted. Six of the seven steps involved in the Breastfeeding Friendly Hospital Initiative that were assessed by the MES were found to be statistically significant in either improving breastfeeding initiation or exclusive breastfeeding at six months. Nurses working in hospitals should strongly advocate for their places of employment to implement the ten steps in the BFHI. Further to implementing the ten steps in the BFHI, nurses should also advocate to create policies that support placing the mother and baby in skin to skin contact, with an extra focus on ensuring the mother's skin is bare.

Nurses who are in contact with women in the postpartum period, either in the hospital or in the public health setting should screen women to determine if they are planning on returning to work before six months. By identifying those women who may return to work early, they can then support them with information about how to continue breastfeeding when separated from their infant. This information should include

education on the benefits of exclusive breastfeeding until six months and how that can be obtained by pumping breast milk for their babies.

This study has also identified that breast pain in the first three months postpartum has a significant impact on exclusive breastfeeding at six months. This finding supports the need to educate women on common breastfeeding management information, but also on the complications that can arise. Most breast pain comes from improper latching, plugged milk ducts or mastitis. If women were educated about the reasons for certain types of pain in the breast and how to manage it, they may be more likely to continue breastfeeding through the difficult experience and ask for assistance from the appropriate healthcare professionals when needed.

Breastfeeding promotion programs have been developed and implemented across Canada over the past number of years. Nurses are often the healthcare professionals who lead these programs and are in direct contact with mothers within forty-eight hours after their birth. This research has supported these types of programs and has identified contact by healthcare professions in the postpartum period as increasing breastfeeding exclusivity until six months. Nurses working in public health should continue to advocate for these programs and ensure that in a time of health care cuts, these programs continue to stay in practice. Nurses who are working in these programs are at an important juncture in time when breastfeeding issues may arise and their contact can be the starting point of further contact in which breastfeeding support can be given over an extended period of time.

Nurses who work in areas of program development should use the information found in this study to target women who are Canadian born, lower education, living common-law, single, divorced, separated or widowed and young mothers. By targeting mothers with breastfeeding promotion strategies, women who are at the highest risk for not initiating breastfeeding or at risk for early cessation will receive the most current information about breastfeeding management.

Areas for Future Research

Most studies published that have assessed predictors of breastfeeding initiation and duration often focus on socio-demographic predictors. This study added many other antenatal predictors into multivariate analyses and found that many socio-demographic predictors no longer have an impact on breastfeeding outcomes. Further research in the area of breastfeeding outcomes should focus on modifiable risk factors. By focusing on modifiable risk factors, nurses can learn what they can do in their practice to affect change in breastfeeding outcomes.

Over the course of the literature review for this study a number of potential modifiable risk factors were identified that were not analyzed by the MES. Some of these include: maternal confidence or self-efficacy with breastfeeding, partner support for breastfeeding, maternal anxiety and maternal attitude toward breastfeeding as potential predictors for breastfeeding outcomes. Studies could be developed to analyze these potential predictors to determine if they do in fact impact breastfeeding exclusivity at six months.

Furthermore, there were five variables that initially were to be included in this study but had to be dropped because of the Statistics Canada restrictions on cell sizes with less than 10 cases. The variables that were dropped from the analyses included: maternal drug use, use of fertility medications or procedures, mother's main activity during pregnancy, facility type for the birth, and ethnicity. Further research into the effect of these variables on breastfeeding outcomes would be beneficial.

This study had a very interesting finding of maternal dissatisfaction with husband or partner support during the labour process as predictor of improved breastfeeding initiation. Qualitative studies in the area of husband and partner support as well as companion support might be beneficial in explaining the reason behind this phenomenon.

As mentioned previously in the section on maternal depression on breastfeeding outcomes, often studies examining depression use different scales and time periods for the postpartum period. A standardized time frame and tool for assessing depression and its effect on breastfeeding outcomes would be beneficial for nurses who work closely with women who may be suffering from depression.

The data from this study has suggested that a mother's perception of receiving adequate breastfeeding information and formula information affect both initiation and duration. Researchers should investigate further what women consider to be adequate breastfeeding information. Randomized control trials could be implemented with different education techniques and contents to determine what is beneficial for mothers. Further research into the damaging effects of providing formula feeding information would also be valuable.

Qualitative research has provided insight into the lived experience of obese women and their breastfeeding experiences. Further qualitative research looking into women who smoke, women who are not married, women who are returning to work and young mothers would be beneficial to learn why they have poorer breastfeeding outcomes. At this time nurses can identify these women as high risk for lower initiation and duration, but strategies to help them have not been developed because the reasons behind their poor outcomes are unknown.

The use of pacifiers is a hotly debated topic in the healthcare sector. This study has placed pacifier use in the first week as a risk factor for early cessation of exclusive breastfeeding before six months. More research into the reasons why pacifiers decrease exclusive breastfeeding would be aid health care professionals in providing the rationale to parents behind the negative effects of pacifiers on breastfeeding.

Canadian nurses must also delve into the reasons behind why west coast provinces appear to have better breastfeeding outcomes and why Quebec has poorer outcomes. By determining which practices are working, nurses could implement these programs in provinces that are struggling with breastfeeding outcomes. Furthermore, more research needs to be done in the Canadian territories, who are often left out of breastfeeding research. In addition to this, research which includes Canadian aboriginal groups should include those who live on reserves.

Conclusion

Maternal and infant benefits of breastfeeding have continuously been demonstrated in the literature (WHO, 2002). As the evidence mounts health care

organizations including the World Health Organization, Health Canada and the Canadian Paediatric Society have raised the recommended length of time for exclusive breastfeeding from four months to six months. Nurses have not ignored the call to increase breastfeeding duration among mothers. The Registered Nurses Association of Ontario has also adopted the recommendation by developing a best practice guideline that supports the WHO recommendation of six months of exclusive breastfeeding.

Despite the research and recommendations by many health care organizations, the statistics from this study found that while 90.9% of Canadian women initiate breastfeeding, only 16.9% exclusively breastfeed until six months. Many studies have focused on the predictors of breastfeeding initiation and partial breastfeeding duration, but little has been done to study exclusive breastfeeding at six months. Furthermore, most of the predictors that have been studied focus on socio-demographics, rather than modifiable predictors. This analysis of the MES has focused on both including modifiable predictors in the analyses and on assessing their effects on breastfeeding exclusivity at six months.

Nurses are often the most prevalent health care professional during a woman's maternity experience. The findings from this study will assist nurses who encounter women during the prenatal, intrapartum and postpartum periods to improve breastfeeding initation and exclusivity at six months with identified modifiable risk factors such as the steps found in the Baby Friendly Hospital Initiative.

Nurses in Canada have a social commitment to deliver health promotion and illness prevention on both an individual and population perspective. At every turn of the

maternity experience there is an opportunity for a mother to interact with a nurse. During these encounters nurses can meet their social commitments of health promotion and illness prevention by providing women with the education necessary to successfully breastfeed exclusively until six months. By understanding the predictors of early cessation, nurses can focus individually on increasing breastfeeding rates, which in turn, will improve the health of Canadian infants.

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Appendix A

Coding of Variables

Table 1

Dependent Variables

Dependent Variables	Question	Coding
Breastfeeding Initiation	Did you try to breastfeed your baby even if only for a short time?	1 = yes 2 = no
Breastfeeding Exclusivity at four months	A calculated variable. Exclusivity was calculated as only having breastmilk for the first four months, no additional nutrition or hydration was given to the baby.	1 = yes 2 = no
Breastfeeding Exclusivity at six months	A calculated variable. Exclusivity was calculated as only having breastmilk for the first six months, no additional nutrition or hydration was given to the baby.	1 = yes 2 = no

Table 2

Exclusion Criteria

Exclusion Variables	Question	Coding
Gestational Age	What was the gestational age of the baby All Respondents	
Immediate infant medical problems	Was your baby admitted to a special care unit All Respondents	1 = yes 2 = no

Table 3

Independent Variables:

Variables	Question	Coding
Attendance at childbirth classes	A calculated variable. Attendance at child birth classes was measured for first time mothers only.	0 = more than one live birth 1 = yes 2 = no

Adequacy of breastfeeding information	Did you have enough information about how to breastfeed your baby?	1 = yes 2 = no
Adequacy of formula feeding information	Did you have enough information about formula-feeding your baby, such as when to use formula and how to prepare it?	1 = yes 2 = no
Mode of delivery	Did you have a vaginal or caesarean birth for ^ baby's name?	1 = vaginal 2 = caesarean
Planned Caesarean	A calculated variable for planned c-sections	1 = planned c-section 2 = all other birth types
Unplanned Caesarean	A calculated variable for unplanned c-sections	1 = unplanned c-section 2 = all other birth types
Use of epidural for labour or birth	A calculated variable for the use of epidurals with women who had a vaginal birth.	1 = yes 2 = no
Use of pain killing medications for labour or birth	A calculated variable for the use of pain killing medications such as Demerol, fentanyl or morphine with women who had a vaginal birth.	1 = yes 2 = no
Use of gas breathed through a mask	A calculated variable for the use of gas breathed through a mask.	1 = yes 2 = no
Husband or partner support during labour	A calculated variable to determine if a husband or partner was present during the labour before the birth of the baby.	1 = yes 2 = no, and did not have partner or husband, did not go into labour(c-section)
Companion present during	Did you have a companion with you during labour or the birth of your baby?	1 = yes 2 = no

labour or birth		
Breastfeeding assistance offered by healthcare providers	Did your healthcare providers help you or offer to help you start breastfeeding?	1 = yes 2 = no
Formula samples offered by healthcare providers	Did they give you or offer to give you any free formula samples?	1 = yes 2 = no
Community breastfeeding support resources offered by healthcare providers	Did your healthcare providers give you information about community breastfeeding support resources for ongoing help?	1 = yes 2 = no
Use of a pacifier or soother in the first week	In the first week after the birth did ^baby's name get a pacifier or soother to suck on?	1 = yes 2 = no
Feeding patterns used in the first week Recoded for Logistic Regression	In the first week after the birth, did you breastfeed ^baby's name according to a fixed schedule such as every 3 hours, or whenever your baby seemed hungry, or a combination of both?	1 = fixed schedule 2 = whenever baby seemed hungry 3 = a combination of both
Fixed schedule feeding	Calculated variable for those babies who were fed on a fixed schedule. (Reference Variable)	1=yes 0=no
On demand feeding	Calculated variable for those babies who were fed on demand.	1=yes 0=no
Combination of both feeding	Calculated variable for those babies who were fed on demand.	1=yes 0=no
Neonatal Skin to skin care provided for the first time holding the baby	The first time you held ^baby's name, was ^he/she naked? That is not wrapped, dressed or in a diaper?	1 = yes 2 = no

Maternal skin to skin care provided for the first time holding the baby	The first time you held ^baby's name, was ^he/she against your naked skin?	1 = yes 2 = no
Location of baby during the first hour after birth	Which of the following best describes where ^baby's name was during most of the first hour after birth?	1 = in bed with you 2 = in the same room as you, but not in your bed 3 = not in the same room as you
Recoded for Logistic Regression		
Baby in Maternal bed	Calculated variable for those babies that were in the maternal bed for most of the first hour after birth. (Reference Variable)	1=yes 0=no
Baby in Maternal room	Calculated variable for those babies that were in the maternal room for most of the first hour after birth.	1=yes 0=no
Baby in Different room	Calculated variable for those babies that were in a different room for most of the first hour after birth.	1=yes 0=no
Infant health	Since he was born, has ^baby's name needed to see a doctor or other healthcare provider for a problem or illness other than a routine check-up?	1 = yes 2 = no
Maternal health	Since ^baby's name was born, have you needed to see a healthcare provider for yourself, other than a routine postpartum visit or check-up?	1 = yes 2 = no
Contacted at home by a healthcare provider	Following the birth, were you contacted at home by a healthcare provider, such as a public health nurse or midwife, to see how you and ^baby's name were doing?	1 = yes 2 = no
Marital status	Calculated variable for marital status.	1 = married 2 = living common law 3 = single, widowed, separated, divorced
Recoded for Logistic Regression		
Married	Calculated variable for those that were married.	1=yes

	(Reference Variable)	0=no
Living Common-law	Calculated variable for those that were common-law.	1=yes 0=no
Single Widowed Separated or Divorced	Calculated variable for those that were single (never married), widowed, separated or divorced. .	1=yes 0=no
Province in which mother lives Recoded for Logistic Regression British Columbia Alberta Saskatchewan Manitoba Ontario (reference) Quebec Atlantic Provinces	Calculated province in which mother lives.	British Columbia Alberta Saskatchewan Manitoba Ontario Quebec Atlantic Provinces 1=yes 0=no 1=yes 0=no 1=yes 0=no 1=yes 0=no 1=yes 0=no 1=yes 0=no
Aboriginal Status	A calculated variable to determine aboriginal status (First Nations, Metis or Inuit) of each mother.	1 = yes 2 = no
Health Care Provider Recoded for	A calculated variable to determine which type of healthcare provider did the mother receive most of her prenatal care.	1=OBGYN 2=family physician/GP 3=midwife,

Logistic Regression		RN, NP, other
OBGYN (Reference)		1=yes 0=no
GP		1=yes 0=no
Midwife, NP, RN, other		1=yes 0=no
Maternal smoking	During the last three months of your pregnancy, did you smoke daily, occasionally, or not at all?	1 = Daily 2 = Occasionally 3 = Not at all
Maternal Perception of Labour and Birth	Overall, would you describe the experience of labour and birth as...?	1 = very negative 2 = somewhat negative 3 = neither negative nor positive 4 = somewhat positive 5 = very positive
Satisfaction with husband/partner's support during labour	How satisfied or dissatisfied were you with the support you received from your husband or partner during labour before the birth?	0=does not have a husband or partner, did not go into labour(c-section) 1=very satisfied 2=somewhat satisfied 3=neither satisfied nor dissatisfied 4=somewhat dissatisfied 5=very dissatisfied
Satisfaction with	How satisfied or dissatisfied were you with the support	0=no

support of companion during labour or birth	you received from your companion(s)?	companion 1=very satisfied 2=somewhat satisfied 3=neither satisfied nor dissatisfied 4=somewhat dissatisfied 5=very dissatisfied
Timing of first breastfeeding	How long after the birth, was ^baby's name first put to breast Respondents who breastfed or tried to breastfeed their baby even if only for a short time	1 = Never (baby was fed with pumped breastmilk) 2 = immediately or within 5 minutes 3 = 6 minutes to less than 30 minutes 4 = 30 minutes to less than 2 hours 5 = 2 hours to less than 12 hours 6 = 12 hours to less than 24 hours 7 = 24 hours or more
Timing of holding the baby for the first time	How soon after the birth did you first hold ^baby's name?	1 = immediately or within 5 minutes 2 = 6 minutes to less than 31 minutes 3 = 31 minutes to less than 60 min 4 = 1 hour to less than 6

		hours 5 = 6 hours to less than 12 hours 6 = 12 hours to less than 24 hours 7 = 24 hours or more
Hours baby spent in a different room than mother	During the first 24 hours following the birth, how many hours in total was ^baby's name in another room? Please include the time ^he/she may have spent in another room while you were resting, at night or during the day. Was it...?	1 = less than 1 hour 2 = 1 hour to less than 6 hours 3 = 6 hours or more
Breast pain in the first three months	During the first 3 months after the birth of ^baby's name, how much of a problem was breast pain?	1 = not a problem 2 = somewhat of a problem 3 = a great deal of a problem
Social support	Since the birth of ^ baby's name, how often has support been available to you when you have needed it? Include companionship, assistance and other types of support you may have needed.	1 = none of the time 2 = a little of the time 3 = some of the time 4 = most of the time 5 = all of the time
Maternal education	Calculated variable of mother's highest level of education.	0 = Grade 8 or lower 1 = Grade 9-10 2 = Grade 11-13 non-graduate 3 = Grade 11-

		13 graduate 4 =some post-secondary degree 5 = trade certificate or diploma from a vocational school or apprenticeship training 6 = Non-university certificate or diploma from a community college, CEGEP, school of nursing etc 7 = University certificate below bachelor's level 8 = Bachelor's degree 9 = Graduate degree (Master's or PhD)
Population of area in which the mother lives	Calculated population of area mom lives in, from 2001 Census data	1 = Rural area 2 = urban pop < 30,000 3 = urban pop 30,000-99,999 4 = urban pop 100,000 to 499,999 5 = urban pop 500,000 or over
Income	What is your best estimate of the total income, before taxes and deductions, of all household members from all sources in the past 12 months?	1 = less than $100,00 2 = 10,000 to less than 15,000

		3 = 15,000 to less than 20,000 4 = 20,000 to less than 30,000 5 = 30,000 to less than 40,000 6 = 40,000 to less than 50,000 7 = 50,000 to less than 60,000 8 = 60,000 to less than 80,000 9 = 80,000 to less than 100,000 10 = 100000 to less than 150,000 11 = 150,000 to less than 200,000 12 = 200,000 or more
Maternal age	Age of mother at birth –Grouped	1 = 15 -19 years of age 2 = 20 to 24 years of age 3 = 25-29 years of age 4 = 30-34 years of age 5 = 35-39 years of age 6 = 40-44 years of age 7 = 45 to 49 years of age 8 = 50 years of age or older

Stress	Thinking about the amount of stress in your life during the 12 months before your baby was born, would you say that most days were...?	1=not stressful 2=somewhat stressful 3= very stressful
Alcohol use in pregnancy	After you realized you were pregnant, how often did you drink alcoholic beverages?	1= was not drinking at the time 2=less than once a month 3=once a month 4=2 to3 times a mont 5 = once a week 6=2 to 3 times a week 7=4 to 6 times a week 8=everyday
	BMI of respondent before pregnancy	
Length of stay after birth	Calculated variable to determine the number of days spent in the hospital, clinic or birthing centre after the baby was born.	0=not born in a hospital, clinic or birthing centre
Age of baby when mom returned to work	Calculated age of baby when the mother returned to work.	0=did not return to work
Mother has returned to work since the birth of the baby	Calculated variable to assess if women who had previously worked at a paid job had returned to work since the birth of the baby, irrespective of the age of the baby.	1=yes 2=no
Maternal immigration	Calculated immigration date.	0=not born in Canada
Born in Canada	Calculated variable	1=yes 2=no
Edinburgh Postnatal Depression Scale	Calculated total EPDS score.	

Birth weight	Calculated weight of baby at birth in pounds
Number of live births	Calculated number of live births

VITA AUCTORIS

Maureen Colledge was born in 1980 in Ottawa, Ontario. She graduated from the University of Windsor in 2004 with a Bachelor of Science in Nursing. She is currently a candidate for the Master's of Science in Nursing degree at the University of Windsor and will graduate in the fall of 2011.